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HANDLING ▪ CRUSHING ▪ SCREENING ▪ WASHING

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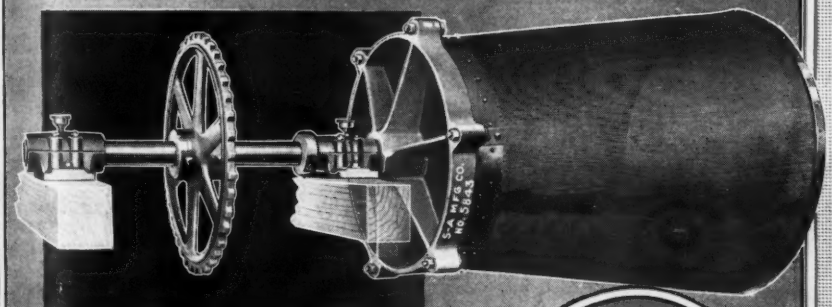

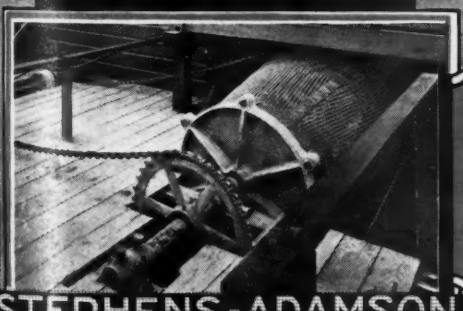

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STEPHENS-ADAMSON MFG. CO. Aurora, Ill.

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July, 1924

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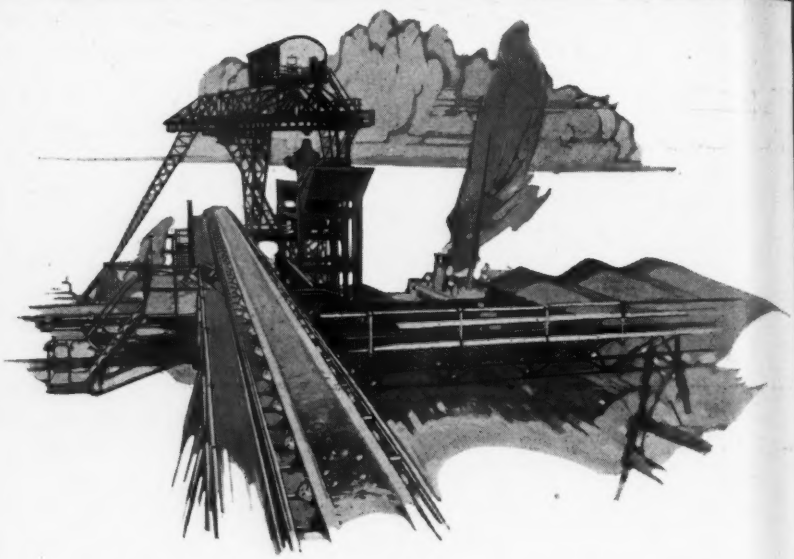

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Brownhoist engineers have helped reduce handling costs for hundreds of plants. Their advice is available to you for any type of handling problem.

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MATERIAL HANDLING MACHINERY

Pit and Quarry

A Monthly Publication for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metallic Minerals

VOL. 8 CHICAGO, ILL., JULY, 1924 NO. 10

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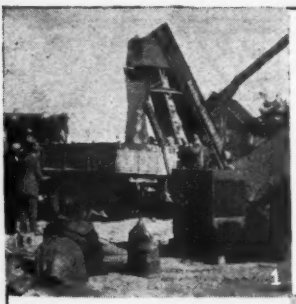


No. 1—Loading trucks from storage piles at the Grant Park Gravel Company, Hewlett, L. I. Operated by one man, this Barber-Greene fills a 4-yard truck in 85 seconds.

No. 2—This Barber-Greene Loader keeps 10 trucks on the move for 9 hours a day. When not used for loading, it is put to stripping surface soil.

No. 3—This Barber-Greene replaced a 10-ton crane for truck loading in the yards of the Lake Shore Stone Company, Milwaukee.

Doing a steam shovel's work at 50% less cost

When S. J. Peterson had a stretch of road to gravel in Scott County, Minnesota, he replaced his steam shovel with a Barber-Greene Bucket Loader, putting the loader to work at a 20-foot gravel bank.

In 21 days it loaded 6,406 cubic yards, keeping 9 to 11 trucks running over a 3½ to 5-mile haul. According to Mr. Scott, the foreman, the Barber-Greene brought about a 50% saving over the operating costs of the steam shovel.

Day in and day out, it maintained its swift loading pace, averaging 305 yards a day.

It is this swiftness which, among other features, has placed the Barber-Greene in an outstanding position in the material-handling field. Whether it is handling sand, gravel, stone, or other bulk materials, its disc feeder digs positively into a pile, feeding direct to the buckets.

It is this method of loading that pit and quarry men all over the country are adopting as the swiftest, most economical and dependable means of maintaining a constant flow of materials.

Our Catalogue N will show you how the Barber-Greene is fitted to wipe out any material-handling trouble that you may have. Send for it now.

Barber-Greene Company, 490 W. Park Avenue, Aurora, Illinois

Representatives in fifty cities

BARBER GREENE

Portable Belt Conveyors Self Feeding Bucket Loaders

Automatic Ditch Diggers

Pit and Quarry

Vol. 8 Chicago, Ill., July, 1924 No. 10

A Word About Financing

OF THE VARIOUS problems which are vital to the success of any business three stand out conspicuously. These are finance, production and sales. The three are of equal importance, yet in many organizations sound financing is given less care than are production and sales. Experts are employed to handle these last two problems. The plant is scientifically operated to deliver the required quantity of product at lowest cost of production. The sales force is skillfully trained under a sales manager so that the product will be distributed efficiently and at favorable prices. But an account of the financial status of a business too frequently indicates that slack and obsolete methods have been used.

One explanation of inefficient financial management is that weakness in the production or in the sales end of the business shows more quickly than in the financial. If the business is apparently thriving, if a spirit of enthusiasm and optimism prevails, and if there is nothing on the surface to indicate the need of an exact financial program, an executive might be unaware of that need and the organization might suddenly find itself on the brink of disaster and realize that bad financial management was the cause.

The best organization can fail if the financial executive does not observe the fundamental principles of financing. He must have knowledge of all conditions of the business in order to be able to anticipate its needs. He must so organize his financial program that unforeseen decrease in business will not prove disastrous. In order to be ready for contingencies there are certain principles of financing which should be followed.

The first step in establishing a sound financial policy is to install a budget system. All expenditures must be planned and provided for. Capital must be divided so that the plant, equipment, overhead, dividends, reserves, etc., are put in the budget. When a loan is contemplated the definite purpose for which it is secured should be shown and that purpose should not be changed. Wisely planned expansion usually justifies loans. The fore-sighted executive provides working capital for growth, and growth is proof of the health of a business.

A budget system, carefully planned and operated will go far to insure growth and prosperity and will prevent stirring surprises. There is not much to be feared in a situation that is understood. Ignorance of a situation increases its direness.

The amount of working capital that the business requires is determined by the length of the season of the industry, by labor turnover, by terms of sales, and by seasonal changes. There are

certain varying conditions which must be kept in mind and provided for. The condition of old equipment, repairs in the plant, the addition of new equipment, the practicability of working changes, additions and extensions—all these and many other urgent matters of improvement must be anticipated when laying out a budget system. The wise executive knows in January what improvements will be needed in December. He seldom finds himself confronted with an urgent need of equipment and no financial provision to meet it. The wise executive will strive to build up a fixed investment. This is the solid rock foundation and the security of the future of his business.

A Triangle of Interests

GENERAL conditions of industry offer a problem to forward-looking producers. There are three sides to the question, a triangle of interests. The producer, the consumer, and the laborer all must be considered; all are vital factors in the solution which must be reached. Some of the elements of the problem are readily stated. The cost of labor today is higher than it has ever been and it is not probable that it will be perceptibly lowered. The standards of living have been fixed and are almost certain to remain high. Labor is not likely to offer the solution of the lower wage.

Can the consumer be counted on to sacrifice himself? Will he accept an increase in prices? The answer obviously is that prices not only cannot be raised but they will certainly be lowered. And competition is so keen that the consumer will find manufacturers bidding for his favor with reductions in prices.

It is then left to the producer to study the situation and tackle the problem. He must deal with the laborer on the one hand and with the consumer on the other. Both look to him for satisfaction. Both will blame him if he fails and praise him if he succeeds.

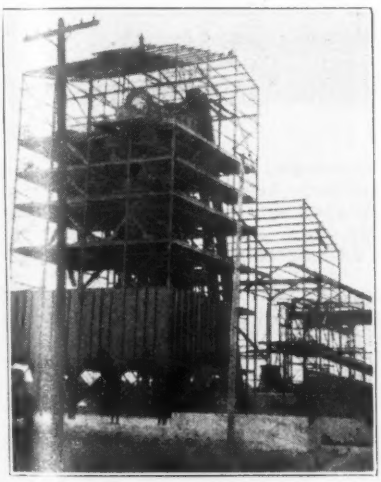
In this enormous task, the producer has one unfailing ally—the inventive genius of America. Increased production is the solution of the problem, and increased production goes hand in hand with labor-saving machinery. This country leads in this phase of industry. It is our custom to forge ahead and we are undoubtedly on the verge of a period of achievement in invention, which will make the past fade into insignificance. Our labor-saving machinery already is phenomenal in what it can accomplish.

The wide-awake producer will discard a machine the instant that a better one is available. The immediate cost will generally prove to be small compared with the ultimate gain. He realizes this and keeps pace with the speed with which we are moving. He is one of the three who holds the solution of industrial problems in his power. With up-to-date equipment the output each year increases. With modern methods he eliminates waste, which has been so characteristic of this country in the past. Our abundant resources have led us into habits of waste which we are now beginning to recognize as loss-creating habits. Cutting down waste increases production.

Midwest Crushed Stone Quarries Complete New Plant

Modern Plant Replaces the Old Plant at Greencastle. Steel, Concrete and Pure Zinc Used in New Buildings

THE Midwest Crushed Stone Quarries, Greencastle, Indiana, have built a modern plant to replace the one destroyed by fire early this spring. The new plant is considerably larger than the old one. The capacity has been increased to 50 cars of stone per 10 hour day.



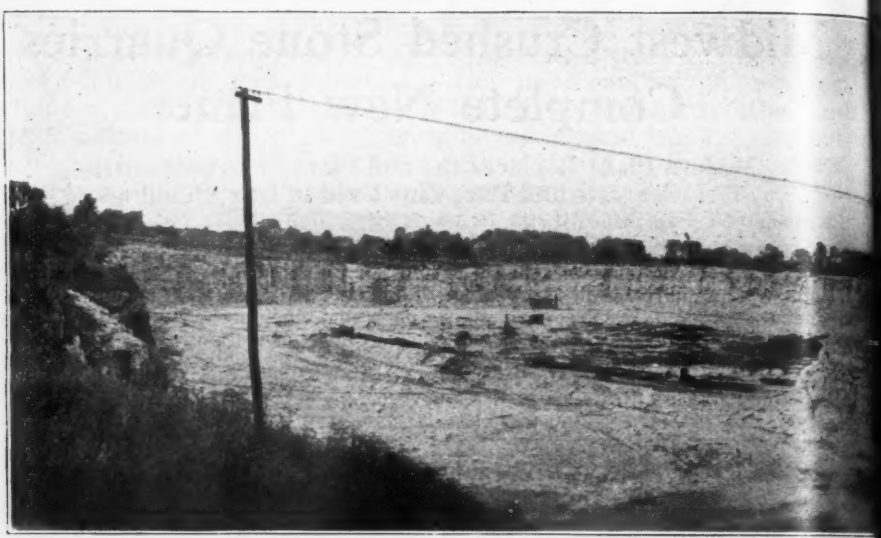
View of Buildings.

The new bins and crusher buildings are built of steel and corrugated zinc roofing and siding has been used throughout. There are eight bins in a double row of four with a loading track under each row. These bins are 16x12 feet and 16 feet high, each with a capacity of 150 ton of stone. A new switch 1400 feet long has been built. There is now storage for 100,000 tons of crushed stone.

The property consists of 56 acres of hard limestone. The Monon, Big Four and Pennsylvania Railroads are available for shipping. The stone from the quarry is shipped to points in Indiana and Illinois, and Central Territory.

From the initial crusher which has an opening 30x90 inches, the stone is elevated by a 42 inch bucket elevator to a 5x12 foot revolving scalping screen. This screen takes out a 2½ inch and finer stone which drops into a 38 inch bucket elevator. The oversize from the scalping screen goes to a No. 8 gyratory crusher set to 2½ inches. The stone from this No. 8 gyratory crusher drops into the 38 inch bucket elevator and is conveyed to a large sizing screen 6x24 feet. A 10 foot jacket with ½ inch openings extends around the end of the screen. This screen produces a ½ inch and finer and a 1 inch, 2 inch and 2½ inch stone. The ½ inch and finer stone drops into two revolving hexagon screens that screen out a ¼ inch and finer stone and the clean ½ inch chips discharge into a bin. The ¼ inch crusher run stone drops into a revolving hexagon screen 5x15 feet, which screens out the ⅛ inch agricultural dust. The ¼ inch chips discharge into a bin. The 1, 2 and 2½

Symons Crushers.



General Vie y and Bu

inch sizes pass over suspended knocker screens before dropping into bins, so that all dust carrying over can be eliminated as well as undersized chips. This dust and small chips taken out, pass through a battery of hexagon screens and are screened and conveyed to the proper bins.

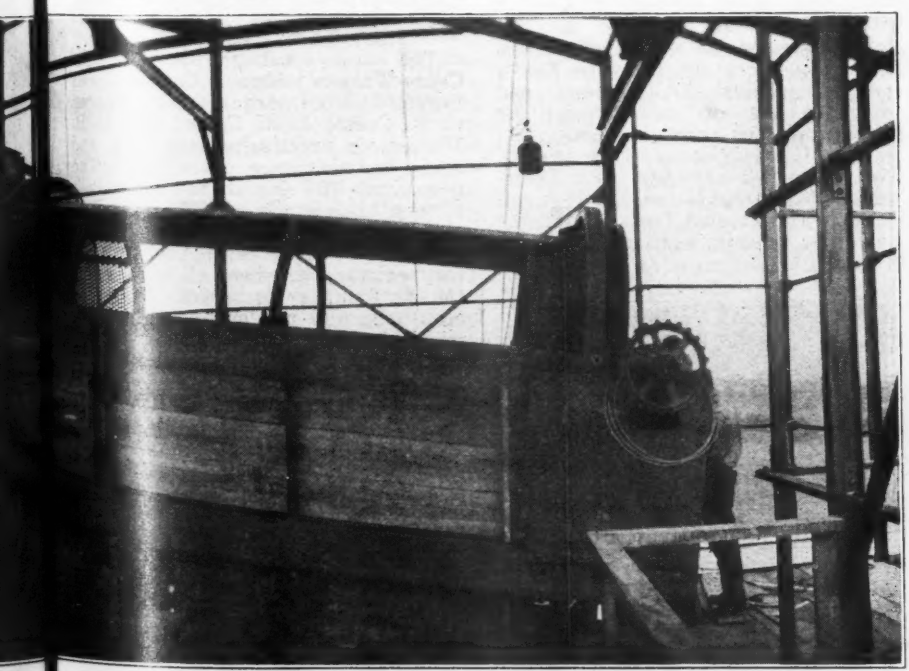
The oversize stone from the 6x24

foot and any getti Ther

Screens, Elevators, 150 H.P. M Top of H

l Vie y and Buildings.

foot screen falls on a belt conveyor and over a magnetic pulley to remove any tramp iron and prevent it from getting into the reduction crushers. Then the stone drops into a chute and is conveyed by gravity to a 36 inch Symon Disk Crusher, and a No. 6 gyratory for further reduction. The crushed stone passes through these crushers into a 26 inch elevator and



H.P. M Top of Building.

is conveyed to a secondary sizing revolving screen 4x12 feet. Here the ½ inch stone is screened out and dropped into a 4x10 foot hexagon revolving screen that separates it into agricultural dust and clean chips. The 1¼ inch stone is screened out and passes over a knocker screen into a bin. The undersize from this knocker screen is delivered into the same hexagon screen as the ½ inch crusher run and is screened and sized into dust and chips. The oversize stone from the 4x12 foot screen drops into a chute which delivers it to a 24 inch Symon Disk crusher for final recrushing and is again elevated by a 26 inch elevator to a 4x12 foot screen for final screening.

The main line shaft, 6 inches in diameter is driven by a 500 horse power motor. Current is furnished by the Wabash Valley Electric Co. From this shaft the crushers, 42 inch elevator, scalping screen, two four yard hoists and dust collecting fan, are driven.

The 38 inch and 26 inch elevators and all screens in top of the building are driven from a line shaft which is driven by a 150 horse power motor. A Link Belt Co. silent chain drive which runs in oil connects the motor with the line shaft. This was installed because of dusty conditions. All screens are driven with heavy sprocket chains. All gears and sprockets are of cast steel. The primary screen has a solid steel frame. In the plant are 10 screens. Every size is rescreened, thus insuring the best preparation. A dust collector to collect dust from around the machines by air suction has been installed.

Main Line Shaft—E. B. Taylor, Mgr.

The steel was fabricated and erected by Hetherington and Berner Co. of Indianapolis. The buildings throughout are built of corrugated pure zinc roofing and siding furnished by the American Zinc Products Co. of Greencastle. This zinc is solid all the way through and is applied just the same as any other corrugated sheet.

The large crusher, screens, and elevators were furnished by Worthington Pump and Machinery Company of Cudahy, Wisconsin. Two Fairbanks Morse motor driven water pumps have been installed, and one Bury Compressor with a capacity of 450 cubic feet. The No. 8 and No. 6 gyratory crushers are Austin crushers, manufactured by the Austin Manufacturing Co.

Three new sizes of material will be marketed—a 12 inch mesh sand, a 30 mesh dust and a ⅛ inch chicken grit.

The new plant is complete in every detail and is the last word in crushed stone sizing and screening.

The officers of the Midwest Crushed Stone Quarries are: C. C. Cartwright, President; L. R. Cartwright, Vice-President; E. R. Cartwright, Treasurer; C. F. Meyer, Jr., Secretary; and E. B. Taylor, Manager.

Cease-Walters Stone Co. Commences Operation

The rock crushing plant of the Cease-Walters Stone Company of Stoyestown, Pa., organized by Messrs. C. B. Cease, J. R. Cease, and J. B. Walters, is practically completed and ready to commence operations. The new plant will ship by rail and truck a very high grade of Silica crushed stone. The plant is of the most modern type, equipped with Austin gyratory primary crusher, all screens of the revolving type, served by bucket elevators, and the entire plant electrically driven.

All machinery, including the motors for the plant, was furnished by the Geo. W. Ziegler Machinery Company of Pittsburgh.

Westinghouse Increases Capital Stock

Coincident with the increasing of the capital stock of the Westinghouse Electric and Manufacturing Company from $125,000,000 par value to $200,000,000 par value at a stockholders' meeting, on June 11, President E. M. Herr announced that conditions in the industry were quite satisfactory and promising. New directors were also elected to take the place of those whose terms expire in 1925, 1927 and 1928.

Elements of Budget Control

Written Expressly for PIT and QUARRY by D. J. Hutchinson*

"BUDGET CONTROL" is an imposing title, but in substance it is neither new nor mysterious. It is simply the intelligent anticipation of future requirements that has long been a common practice, except perhaps among bankrupts and vagabonds.

The form and methods of budget control, however, are of comparatively recent development, particularly in their application to industry. Government budgets have been generally known and occasionally practiced for some time, and in one field of business —that of retail merchandising—the budget has come to enjoy a recognized position of importance.

But in industry, the application of the budget has been more recent, though no less successful, meeting as it does, the necessity for a system of centralized control. This is imposed by the peculiar characteristics of the modern business organization, its size and attendant specialization of functions, delegation of authority and division of responsibility. In the earlier days of industrial development, when the one man organization was the predominant type, budget control was unnecessary. The "old man" had every detail of the business under his hat. He could discharge all of the essential functions, even in a relatively large business, because he had in most instances, built the business from the ground up, had personally performed the detail operations in every department, and he knew the how and why of everything that went on. But in the more specialized organization of today each man is master of his own job while few are masters of the business as a whole. Even the principal executives are often chosen because of particular ability in their line, and they may be frankly ignorant of many of the other important functions of the business.

Hence there must be devised some other means of co-ordinating the various business functions, without which no amount of ability in the individual fields, will make the business successful. What these activities are, must obviously in a paper of this length,

D. J. Hutchinson

be stated in the most general terms, and the particular variations that appear in every individual business, must be left to a more exhaustive treatment than it is possible to undertake here. Certain functions, however, are fundamental in all businesses, viz: (1) production, (2) sales, (3) finance. There are others, as: accounting, personnel, welfare, etc., but they are subordinate. Production, sales, and finance, on the other hand, or equivalent functions, are always found, though perhaps by another name. In retailing, for example, production gives way to buying, but the function is essentially the same, that of providing the material subject of the business activities. The fundamental problem of budget control is therefore the co-ordination of production, sales, and finance.

Of production and sales, it is difficult to say which one comes first. In fact they are so intimately related that it is impossible to think of one except in terms of the other. Production can not be planned independently of sales possibilities, nor can sales be anticipated except within the limits of the production obtainable. But if this is true, it is even more certain that neither sales nor production can be planned without regard to the financial requirements, possibilities and limitations of the business.

This inter-dependence of one business function on another, and particu-

*Member of Lawrence Scudder & Co., Accountants and Auditors.

larly the dependence of the whole structure, on a sound financial foundation, lies at the heart of the problem of budget control. Sales cannot be increased without increasing production and ordinarily production cannot be increased without increasing the requirements for money in the business. It is true that some successful businesses have been built up on a "shoe-string," but it is also true that "lack of capital" is high in the list of causes of business failures. Hence the popular idea of a budget as a financial budget, is correct to the extent that it is as a basis for the financial budget that the other departmental budgets are prepared, and it is the limitations of the financial budget that determine the budgets dependent on it; for while lack of co-ordination between the operating departments is a serious condition that may bring losses, lack of co-ordination with the general financial plan is a fatal condition, that eventually will bring the sheriff.

Thus in attempting to establish co-ordination by budget control, we seem to run into a vicious circle, so closely are the various business functions inter-related. We cannot establish the sales budget without regard for the production possibilities, nor vice versa, nor determine either the sales or production program until we know the financial plan, which is in turn dependent upon both sales and production. It is to surmount this not only apparent but also very real difficulty that the technique of budget control has been developed. It is a process of taking preliminary estimates from each department and delicately adjusting them to meet their mutual requirements, always keeping in mind that the ultimate goal is a completely unified plan of action for business as a whole.

The first step in budget procedure is therefore the preparation of estimates by the various department heads. It is assumed, of course, that there is available data reasonably accurate and complete, regarding the activities of the departments in the past on which to predicate the estimates for the future; that is, the budget is essentially a forecast of the future based on the experiences of the past and giving effect to as many new elements as can be foreseen.

There is some argument for having these departmental estimates prepared by an auxiliary staff rather than by the department heads, on the grounds that the latter should not be required to take time from their regular duties for this purpose and that others trained specially in the work can accomplish it more quickly and efficiently. Probably both these arguments have some merit, but it is more than compensated by the advantages of having those responsible for the performance prepare the estimates. They are best able to do so, having a more intimate knowledge of the possibilities, and they are more inclined to feel a responsibility for living up to an estimate they have themselves prepared.

After the departmental estimates have been prepared, they must be combined into a general budget. Here the services of an auxiliary staff, headed by an individual trained in budget procedure, are valuable. Some technical skill is necessary to prepare and present in intelligible form, the miscellaneous figures that will come in from the department heads, and for that reason there should be some competent individual in charge of budget procedure.

However the final adjustment of the budget, where serious discrepancies have appeared between the estimates of the various departments, is again a matter that must be referred back to those responsible for the performance. Often a conference of the operating executives will eliminate many of the discrepancies on the preliminary budget, leaving the final settlement of any disputed factors to the one who is finally responsible for the performance, the chief executive, general manager, or president.

After the budget has been finally determined, there should be prepared a balance sheet and profit and loss statement, giving effect to the estimated operations of the budget period. The final budget with the estimated balance sheet and profit and loss statement, should be submitted to the proper authority for approval, usually to the board of directors, who of course may approve the budget in its entirety or in part, directing such changes in it as they see fit.

Such changes must, however, be made with a due regard to the necessities of the budget as a whole. That is, the budget has been carefully built up from a multitude of inter-dependent elements into a unified plan, and changes cannot be made in any one

feature of the plan without regard to the effect which such changes may have on other parts of the plan. Thus it cannot be arbitrarily determined to reduce the advertising appropriation without regard to the fact that such reduction will undoubtedly be reflected in the sales and through reduced sales, meaning reduced income, affect the financial schedules. Thus a reduction in advertising expense will not necessarily be a net gain in income. In fact, any reduction in expense will usually cause some reduction in income, and it must be carefully determined that the reduction in income will not be more than in proportion to the reduction in expense. For this and similar reasons, unless the changes proposed are carefully considered in relation to the effect which they may have on other integral parts of the plan, the whole purpose of the budget as a means of coordinating the various business functions, is defeated.

For the same reasons the work of the budget is not completed when the budget has been established, but a systematic effort must be made to see that it is lived up to in all of its essential provisions. To this end reports on the progress of operations are necessary. The executive in charge of budget procedure must determine what reports are necessary, what they shall contain, in what form they shall be presented and how often and who shall make them. In some instances those can be furnished by the accounting department, and it is often argued that it is an unnecessary duplication of work to have them made elsewhere, that the making of reports is the proper function of the accounting department and that the time of the operating departments should not be taken for this purpose. Here, as in the case of the preparation of estimates, the arguments have some merit but they overlook one of the primary purposes of the budget—that of control. Ordinarily reports from the accounting department do not come in quickly enough to be of great benefit in correcting conditions likely to bring about a serious departure from the budget plan. It is, for this reason, usually necessary to have the executive in charge of budget procedure, furnished with supplemental reports directly from the operating departments. While these reports will not agree penny for penny with those subsequently obtained through the regular accounting channels, they will be sufficiently accurate for the purposes at hand, which are to discover and correct any tendencies that may disturb the budget plan before they shall have gained sufficient headway to impair seriously the estimated performances.

To this same end also, that of enforcing the budget plan the operating executives should be required, as soon as the budget has been approved, to formulate definite plans whereby they will be able to fulfill the budget requirements, such as quotas in the sales department and detailed production schedules in the production department.

Finally in enforcing the budget, wherever serious discrepancies occur between the actual and the estimated performance, steps must be taken to correct them. Orders to this end should proceed directly from the chief executive, rather than from the executive in charge of budget procedure. The function of the latter is purely administrative, to see that the budget routine is properly carried out. The actual control where it affects the activities of the several departments, must be exercised by the chief executive, since he alone has the authority and prestige necessary to have the orders carried out and to eliminate the common friction between departments often referred to as "passing the buck." For instance in a plant operating under budget control, the production department will often allege that the reason for its falling down on the pre-determined schedule is the failure of the employment department to provide the operatives called for in the plan, or of the mechanical department to keep the machinery in proper condition. It is the function of the budget system to show where these difficulties arise but it is the function of the chief executive and his staff to straighten out the kinks.

One important element in budget procedure which should receive careful consideration in establishing the budget is the length of the budget period. There are several variable factors influencing this so that no set rule can be laid down. Due consideration must be given to such factors as the length of the production period; that is, whether the product is one that is turned out rapidly or one that requires a long time in process; the merchandise turnover period; the customary terms of payment and the

method of financing; the length of the accounting period, and the extent and form of the data that is available on past operations. Most important of all, however, the two-fold purpose of the budget must be kept in mind, that of giving a perspective on future operations and that of furnishing a rapid check on the degree of approximation being obtained between estimated and actual performance. For this reason it is usually well to prepare the budget for a fairly long period in advance, say a year, with supplementary schedules on monthly, or at most, quarterly operation, with which the actual performance can be compared.

Budget control, in addition to providing a means of co-ordinating the activities of the highly specialized organization, has further benefits that make it applicable not only to the large organization, but also to small organizations where perhaps simply the problem of co-ordination can be solved by more direct means. It gives the subordinate executives and department heads as well as the responsible management, a perspective of the future and a definite goal toward which to work. It promotes thereby the "esprit de corps" by demonstrating the important bearing each man's job has on the success of the enterprise as a whole, and it enables everyone to know exactly what is expected of him.

The example of the treasurer best illustrates this last point. The treasurer who has been furnished with a carefully prepared budget based on the anticipated requirements of the business, knows exactly what funds he will have and what funds he will have to obtain, and when. Moreover he is able to show exactly how he proposes to use his funds, and is placed thereby in an infinitely better position for obtaining financing than if, because he can not foresee his requirements, he is obliged to wait until the demand is upon him and then secure the needed money as best he can. Particularly if the treasurer is able to submit also a budget from the previous year showing close correlation between estimated and actual performance, he has gone a long way toward establishing the confidence that is the basis of all financial transactions. Most businesses, particularly those of a seasonal character, are dependent to some extent on current borrowing to tide over the peak demand in their financial requirements, and here budget control is especially valuable.

The Revenue Act of 1924

THERE are some important changes in the 1924 income tax laws. 1923 taxes have been reduced 25% for all tax payers other than corporations. The tax payer now has 60 days in which to appeal to the board of tax appeal instead of the 30 in the 1921 Act. When extension of time is granted and tax or interest is not paid before extension expires, 12% interest is collected instead of 6%. No provision is made in the 1924 law for cases where property in an exchange has no realizable market value. No gain or loss is recognized on exchange of property held for productive use in business; none if stock is exchanged for stock, securities for securities in the reorganization. In all cases of mixed property, the 1924 law recognizes no loss, though a gain may be recognized.

Corporation income tax remains unchanged at 12½%. In the matter of registering losses, there is one important change, namely that in cases of capital losses recorded by the sales of securities or property held for two years or over—only 12½% of the loss may be deducted. No deduction can be made for losses registered by sales securities if within 30 days before or after said sale the tax payer has acquired or has entered into a contract or option to acquire substantially identical property.

Tax is imposed on gifts to a total amount in excess of $50,000.00, except that in computing said amount, gifts to any one person aggregating less than $500.00 need not be included; as likewise gifts to charitable, religious and educational institutions. Gift tax is on a sliding scale of 1% on the first $50,000.00 up to 40% on all in excess of $10,000,000.00. If the total is not in excess of $5,000.00, it shall be considered as earned income, and all earned income is subject to 25% reduction in tax, compared with regular rates. The maximum earned income allowed is $10,000.00. Tax payers engaged in an unincorporated business or in a partnership, may consider a maximum of 20% of the annual net profits as earned income.

Fifth Universal Gypsum Plant Now Producing

The Universal Gypsum Company Have Started Their Plant at Rotan, Texas of a 100,000 Ton Capacity. This Brings Their Total Capacity to 550,000 Tons.

THE Universal Gypsum Company's rapid plant development to 550,000 tons capacity, with its five mills operating in the eastern, western, and southern states, is one of the outstanding topics of trade comment. This company has become one of the only three national producers of a full line of gypsum products. This company recently acquired control of the plant at Akron, New York, of the American Gypsum Company. With the Akron plant, the plant at Batavia, New York, the two plants in Iowa, and the Rotan plant, the total capacity has been increased to 550,000 tons.

The following information relates to its Rotan (Texas) plant, which just began operations a few days ago. In the latter part of 1923, this company purchased in fee simple an uninterrupted deposit of approximately 460 acres of gypsite containing about 6,000,000 tons. According to geological reports, this is an unusual deposit for this character of material as such a deposit is generally found in what is known as pockets requiring a large scope of territory for sufficient raw material to justify building a mill.

The Universal Gypsum Company began building a modern mill on this deposit about February 1 of this year and on June 9 went into production. From this property they serve all the southern markets, including Kansas, Missouri, Southern Illinois, Southern Indiana, Kentucky, and states south. Their mill is complete in that it has its own power plant, thereby not being subject to the uncertainties of purchasing power from a utility company. They are fortunate in having the M. K. & T. Railroad cross their property, thereby minimizing the difficulties and expense of extending railroad building and also insuring better shipping facilities.

We understand the Universal program is to shortly construct a wallboard plant as well as a gypsum tile plant on the same basis as is their present wall plaster plant, which is modern in every particular.

A Marion gasoline electric traction shovel is used to dig and load raw gypsite into western dump cars, and

a 7-ton Whitcomb gasoline locomotive is used to haul these cars to a special crusher located at the mill. From this crusher gypsite is fed to a belt conveyor which conveys it to a bucket elevator, which in turn delivers it to the calcining kettles or to a belt conveyor which transports it to the raw storage shed. The latter has a capacity of 4,000 tons of gypsite, which insures continuous operation of the mill at all times regardless of weather conditions which might hinder operation of the gypsite beds.

The calcining kettles are equipped with a modern fuel oil system for firing and also with recording thermometers to accurately control calcination and quality of the plaster. From the kettles the stucco is discharged into hot pits and from thence by screw conveyors to the bucket elevator which hoists it to the screens. These screens remove all coarse material which is spouted to Sturtevant vertical emery mills for grinding. The stucco is conveyed from these screens to suspended steel storage bins.

In the next step the stucco is automatically fed into weigh hoppers which are suspended from the bottom of the storage bins and directly over the mixers. Both retarder and fibre are added to the stucco in these weigh hoppers and the charge automatically emptied into the mixers and from thence into Bates valve sacking machines placed directly under the mixers. This sacked material is then loaded either on to the cars for shipping, or is taken into the warehouse.

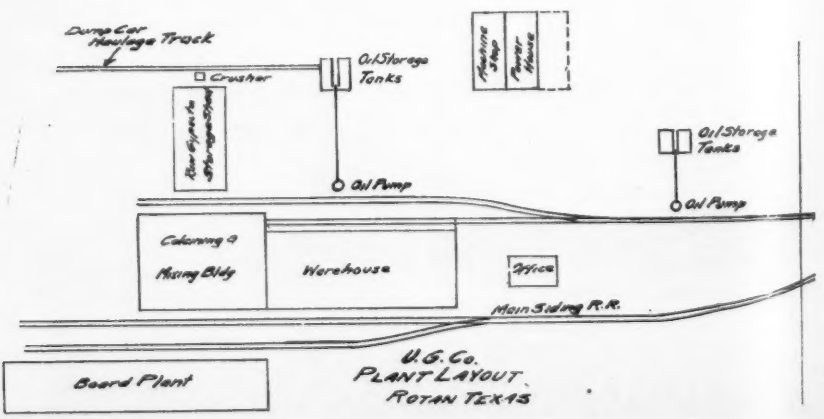
In addition to the recording instruments on the kettles, the plant is equipped with a complete laboratory in charge of a competent chemist which gives the Universal Gypsum Company perfect control over the entire output of the mill and insures a very carefully prepared high grade product.

This plant is electrically operated, power being furnished by the Universal Gypsum Company's own power house, which is equipped with Superior Semi-Diesel engines connected to an alternating current generator. A water softening plant and a water cooling system are operated in connection with the engine.

The entire plant is modern and up to date in every respect and all of the buildings are of steel and concrete construction and strictly fireproof. The plant is now operating and some very interesting features are disclosed in the cut showing the plant lay-out. A partial view of some of the building of the plant also appears in a separate cut.

The water softening plant and the water cooling system were designed by the engineers of the Universal Gypsum Company. The conveyors were built to specifications drawn up by the engineering department. The electrical equipment was furnished by Westinghouse and General Electric. The calcining kettle and the weigh hoppers were built special, as were the crusher and mixers.

Mr. W. C. McDowell has been elected a director and vice-president in charge of sales of the Traylor Engineering and Manufacturing Company, Allentown, Pa.



North State Feldspar Corporation Have Modern Grinding Plant

Mill Operating 24 Hours Daily Producing 45 Ton. Handling and Labor Costs Reduced to Minimum.

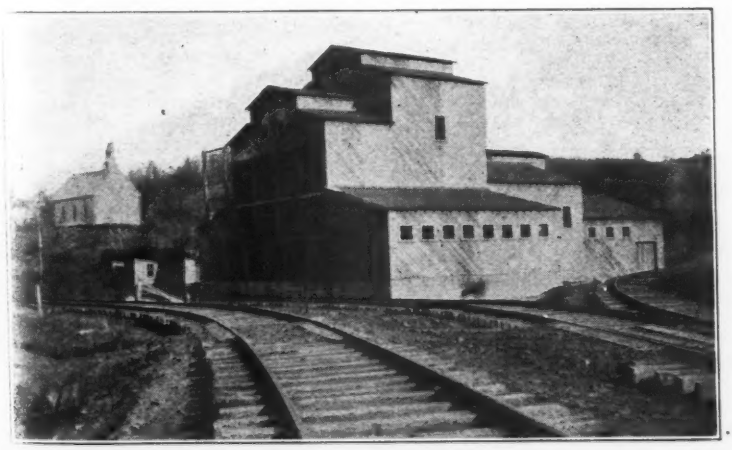
THE North State Feldspar Corporation started operations on March 31, 1924 at their new and modern grinding plant at Micaville, North Carolina. This mill was designed by Rudolph Glatly and construction started in July, 1923.

The mill is located along the main tracks of the Black Mountain Railroad. Two side tracks have been installed by the company. One of these is used for the crude feldspar shipped from the mines and the other is used as a loading track for the material being shipped from the mill.

The plant has been arranged so as to reduce handling and labor costs to a minimum. This is essential in merchandising such a low priced ore as feldspar. The grinding process is simple and care has been taken in the design of the mill so that a minimum of iron, which contaminates the ground ore, comes in contact with the feldspar.

The plant is being run 24 hours a day with a force of only twelve men —one foreman and three laborers for each eight hour shift. These men handle the entire output of the mill, which averages 40 tons of ground feldspar a day. They unload the crude material, feed the crusher, attend the bagging machine and load the ground feldspar into the cars. The crude feldspar is being bought from the producers of North Carolina.

The crude feldspar is dumped onto the crusher platform as it comes from the mines. This platform has a storage capacity of eight carloads. From the platform, the feldspar is fed to a "Reliance" crusher, manufactured by the Universal Road Machinery Company, where it is reduced to a fineness of one quarter inch and less. The material is then carried by a "Reliance" continuous bucket elevator, to a twenty-five ton intermediate bin. From the bin the feldspar is fed through an adjustable table feeder to a Hardinge Conical Mill. This mill is being driven by a motor and chain drive. This Hardinge mill discharges the ground feldspar into a Webster Bucket elevator, which discharges the material into an adjustable 14 foot Gayco Air Separator. This separator has an efficiency of about seventy-five



North State Feldspar Corporation.

per cent. The oversize is carried back on a Webster belt conveyor and again fed through the Hardinge Mill. The Webster bucket elevator and belt conveyor were built by the Webster Manufacturing Company of Chicago, Illinois, according to specifications of Mr. Glatly. The "fines" discharge from the Gayco Air Separator is discharged into a bagging machine hopper or onto an elevator which discharges into storage bins for bulk shipments as the occasion demands. This is accomplished by a "cut off" on the air separator. The air separator was manufactured by the Rupert M. Gay Company and the bagging machine is a Wolf Friction Barrel Packer, manufactured by the Wolf Company of Chambersburg, Pa. All of the grinding machinery is driven by Allis-Chalmers individual motors.

The flow of material conforms to the ideal pulverizing plant. Although data cannot be presented at this time, this plant has as low, if not a lower, grinding cost than any other plant of equal capacity, in the United States. PIT AND QUARRY, in a future number, expects to present some data on grinding costs, and the figures on this plant will probably be available at that time.

Space has been reserved in the same building so that the capacity of the plant can be doubled. With the present layout, this can be accomplished by the addition of another Hardinge mill, one more elevator, and another Gayco Separator. These two units could be handled by the present force of men. Concrete foundations were poured for this equipment at the time the plant was erected, so the capacity could be doubled when necessary.

The feldspar produced is used by manufacturers of glass, enamel and chinaware. The fineness of the ground product ranges from 60 mesh to 200 mesh.

The North State Feldspar Corporation was organized by Mr. Rudolph Glatly who has been associated with feldspar producers for a number of years. The Company has an authorized capitalization of $300,000 and is chartered under the laws of North Carolina. The present officers are: Dr. S. J. Hamilton, President; E. F. Watson, Vice-president; J. D. Hughes, Secretary and treasurer; and Rudolph Glatly, Superintendent.

Paper Cement Bags

By more than doubling the number of paper bags used last year the manufacturers of portland cement have shown a greatly increased dependence upon paper for containers, say press reports. While cement shipments, according to the latest report of the United States Geological Survey, show a growth of more than 15 per cent during 1923, the estimated paper bag consumption jumped some 130 per cent during the same period.

The San Francisco offices, showrooms and warehouses of the Williams Patent Crusher and Pulverizer Co. of St. Louis, Mo., have been removed to new and more adequate quarters at 415 5th Street, San Francisco, Calif., near Harrison.

Another View of the North State Mill.

Safety in Quarries Should Have More Attention

Written Expressly for PIT AND QUARRY by A. H. Findeisen*

SAFETY in many of the limestone quarries has not received the attention usually given in the large, well organized industrial plants. The head office with the president or manager in charge is usually located in some distant city and the quarry operations, including accident prevention, are left to the foreman in charge.

The average quarry operation is not extensive enough to justify the employment of a full time safety engineer and the foreman, then, is the determining factor in safety work. He is a very important person, and one to reckon with in the prevention of accidents. The foreman in trying to educate his men has not very much to worry about. He knows just what the hazards are and what the common ways are in which his men get hurt.

To get the foreman interested in accident prevention is of the utmost importance. He has direct supervision of the workmen, and it is to him we look to see that the working plans and conditions are safe and to instruct his men in the safe way of doing things.

Unless the operator makes safety first a part of the company's program and takes the initiative in seeing to it that the foreman carries out these policies, accident prevention is bound to suffer.

It has been the writer's experience that many limestone quarry foremen do not thoroughly understand the principles of safety. When checking up on what has been done in the way of complying with safety regulations, it has been found in so many quarries that just enough had been done to "get by." On being asked why his men are not made or trained to do his work along safe lines, the foreman would state that they were ignorant foreigners and will not do as they are told. It has been found, in other cases, that foremen with an entirely different attitude install good substantial safeguards, have little trouble in having them kept in place and no trouble at all in having his men conduct themselves out of danger. It follows, that what one foreman can do the other should be able to do.

The actions of the foreman should reflect accurately the policy of the employer for he is the link between the employee and the employer. Personal letters from the general superintendent, manager or owner to the individual foreman constitute a most effective means of getting the foreman's interest and cooperation in accident prevention. Such a letter should state the management's strong desire for safety and should appeal to the foreman in a forcible way for his hearty cooperation. It should also take up the instruction of the new men and call attention to the use of good judgment in assigning employees to suitable work, so as to have the right man in the right place. It should be insisted upon that all state regulations and insurance recommendations are carried out to the letter and all dangerous conditions made safe. All serious accidents should be thoroughly investigated and means taken to prevent a recurrence of a similar accident. The management at the end of the year should tabulate all accidents, giving the cause, cost and other information and furnish a copy to the foreman together with instructions as to what might be done to reduce the number of accidents. It should be the purpose of the officials on their periodical visits to the quarry to take up the safety question as well as matters pertaining to production. If these ideas are carried out, much has been accomplished to get the foreman's cooperation, and results are sure to come.

In order to consider the various hazards met in quarrying, the following classification of causes may be used and each subject can be treated with its relation to the operation as a whole. The scheme of classification follows the subdivision of accidents as used by the U. S. Bureau of Mines. All of the accidents can be traced directly or indirectly to all of these causes.

*Industrial Commission of Wisconsin.

1. Falls or slides of rock or overburden.
2. Handling rock at face.
3. Hand tools.
4. Explosives.
5. Haulage.
6. Falls of persons.
7. Flying objects.
8. Machinery.

Other causes.

The principal prevention measures which must be taken to avoid falls of rock consist of careful inspection of the face and proper trimming when necessary. Several factors such as frosts, blasting, wet weather, etc. may influence falls of rock, but all of these must be carefully guarded against. Practically all quarries burning lime employ hand loading and all rock is cleaned up before another round of holes is set off, thus exposing the men directly to the hazard of being struck by a possible fall of rock. Immediately after a big blast all loose rock should be thoroughly trimmed while the men can work from the top of the broken rock and as the pile recedes, care should be taken to trim and clean all loose rock laying on the shelves. During wet weather the men should not be allowed to work next to the face. Plans should be made to have plenty of broken material ahead so that the men will not be obliged to work next to the face during thawing action in the spring. Good extension ladders, rope, and bars should be provided for the men doing the trimming.

State and insurance requirements for explosive magazines provide for bullet proofing, fireproofing, location, danger signs, separate storage for caps and so on. Good cap crimpers and loading stock must be provided. The handling, storage and use of explosives should be carefully supervised by the bosses, and all precautions taken to provide proper magazines, to ascertain that primers are properly made up, to see that the blasters thoroughly understand the use of explosives, that missed holes are handled correctly and to regulate the time of blasting.

Explosive manufacturers have given wide publicity to the precautions necessary for the safe handling and storage of explosive, even to the enclosing of a set of printed instructions in each box. There is little excuse for the operator not knowing how to handle explosives correctly. Cheap and efficient shelters for secondary blasting can be provided and the men made to use them. The men should be made to give the large primary blasts a wide berth. If the half hour rule were enforced in every instance, accidents from misfires or delayed blasts would be reduced to a minimum. It is the opinion of the writer that 90 per cent of explosive accidents are due directly or indirectly to misfires and flying rock.

There are but few serious accidents due to improper use or condition of hand tools, but as a source of slight accidents they are prolific. The prevention of this type of accident can be accomplished mainly by inspection and instructions in their proper use. Mushroom heads, broken handles, and many other defects should not be permitted.

Haulage constitutes a prolific cause of serious accidents and many of these can be traced to poor track and car equipment. By employing quick acting men for this work, instructing them to handle the work safely, keeping trackway free from loose material and keeping equipment in first class condition, accidents from this source should be kept down to a minimum.

Persons engaged in "trimming" should be provided with ropes which are placed around their bodies and fastened to some safe point above. Trimming is often carried out under hazardous conditions, as it is sometimes necessary that the men in order to properly trim the bank or slope must place themselves in a position where a movement of the rock or loss of balance might cause a bad fall. The top of the bank where the crushing plant and roadways adjoin must be provided with finus. Pit quarries should be equipped with good substantial stairways equipped with landings and handrails and kept free of snow and ice during the winter months. Runways in connection with inclines, and the tops of lime kilns should have plenty of clearance and equipped with handrails. This holds true with all runways and stairways in the quarry plant.

There should be little excuse for an operator not keeping the quarry floor clear of broken material. One large line operator has been very successful in this respect, by offering a prize to the foreman having the cl an-

est quarry. Every quarry owned by this company was found by the writer to be clean and tidy.

There need be no comment here on safeguarding dangerous machinery. Anyone who is at all familiar with state or insurance requirements and the seriousness of machine accidents has no excuse for neglecting this important item. A most important responsibility resting on the foreman is to see that employees replace guards when removed during repair work.

COMPENSABLE INJURIES IN WISCONSIN QUARRIES

Year 1922—Settled Cases

	Total no. of injuries	Deaths.	Permanent. Partial.	Temporary 1–2 weeks.	Temporary Over 2 weeks.	Days lost due to Total no. of days lost.	Deaths.	Permanent partial	Temporary 1–2 weeks.	Temporary Over 2 weeks.	Indemnity.	Medical.
In and about quarry												
1. Falls or slides of rock or overburden	14	..	1	4	9	839	..	196	48	595	1,249	571
2. Handling rock at face	27	..	..	11	16	583	..	...	125	458	748	402
3. Timber or hand tools	4	..	..	1	3	74	..	...	10	64	110	49
4. Explosives:												
(f) Caps, Detonators, etc.	1	..	1	..	..	700	..	700	...	...	1,658	1,450
(i) Premature shots	2	..	..	..	2	228	..	...	...	228	365	378
(k) Struck by flying rock	1	..	..	..	1	25	..	...	...	25	31	10
(l) Miscellaneous	6	..	1	2	3	184	..	54	33	97	395	212
5. Haulage:												
(a) Hand and animal	11	..	1	3	7	570	..	280	36	254	1,892	446
(b) Mechanical	2	..	..	..	2	54	..	...	...	54	96	32
6. Falls of persons:												
(a) Falling into quarry from surface benches or face	4	..	..	2	2	59	..	...	25	34	68	87
(b) Falling from hoists, derricks, ladders, etc.	2	..	..	1	1	59	..	...	10	49	132	41
7. Falling objects (other than 1 and 2)	3	..	1	2	..	447	..	427	20	...	2,457	474
8. Flying objects:												
(a) From sledging	4	..	3	..	1	187	..	169	...	18	1,284	292
(b) Drilling, chipping, bull-setting	2	..	..	2	..	19	..	...	19	...	6	10
(c) Others	2	..	..	1	1	35	..	...	14	21	51	62
10. Drilling (by machine or hand)												
11. Machinery:												
(a) Hoisting cables and attachments	1	..	..	..	1	15	..	...	...	15	12	9
(b) Guys, cranes, derricks, and attachments	1	..	..	..	1	135	..	...	...	135	283	121
(c) Pumps and hoisting engines	2	..	..	1	1	28	..	...	13	15	28	30
(d) Steam shovels	1	..	1	..	..	553	..	553	...	...	2,251	553
(e) Other machinery	1	..	..	..	1	29	..	...	...	29	61	17
15. Other causes	5	..	..	2	3	137	..	...	21	116	210	42
Total—Quarry	96	..	9	32	55	4,960	..	2,379	374	2,207	13,387	5,248
Outside works—crushing plants, etc.												
16. Haulage:												
(a) Hand and animal	1	..	..	..	1	17	..	...	...	17	22	13
(b) Mechanical	2	..	..	1	1	65	..	...	9	56	81	26
(c) Railway cars and locomotives	1	..	..	..	1	28	..	...	...	28	63	58
17. Machinery	1	..	..	1	..	14	..	...	14	...	18	8
21. Falls of persons	4	..	..	..	4	122	..	...	...	122	239	76
22. Falling objects, rocks, timbers, etc.	6	..	..	..	6	215	..	...	...	215	323	324
23. Flying objects:												
(a) From sledging	1	..	1	..	..	1,120	..	1,120	...	...	2,700	349
(b) Others	1	..	..	1	..	8	..	...	8	...	3	17
24. Handling rock by hand	4	..	..	1	3	104	..	...	10	94	134	66
25. Burns	2	..	..	..	2	35	..	...	...	35	43	19
26. Others	12	..	..	3	9	380	..	...	32	348	901	462
Total—Outside Works	35	..	1	7	27	2,108	..	1,120	73	915	4,526	1,418
TOTAL—QUARRIES	131	..	10	39	82	7,068	..	3,499	447	3,122	17,913	6,666

Trinity Portland Cement Company to Finish New Plant This Year

THE Trinity Portland Cement Company has started construction of a 500,000 barrel cement plant at Fort Worth, Texas, to be completed this year, on a site adjacent to the north city limits of Fort Worth, comprising 602 acres of limestone, which is underlaid with shale. The Fort Worth plant will be erected 40 miles from the Dallas plant, which has been producing approximately 1,500,000 barrels a year.

The new plant will be served by the Sante Fe and Rock Island railroads. Sanderson cyclone drills, two Marion steam shovels, and the Woodford electric haulage system will be used in the quarry. The initial crusher is to be a Williams Mammoth hammer mill and will be equipped with a Stephens-Adamson feeder. This equipment will make it possble to reduce from 36 to ¾ inch in one operation and the handling of 250 tons of material per hour. A continuous roller type bucket elevator will deliver the crushed material to a concrete storage building. This building is 75x360 feet and provides individual bin storage for crushed rock, shale and clinker. A Shephard electric overhead grab basket crane, traveling the entire length of the building, will be installed.

The machine shop, plant office, laboratory and supply room, are all in one building 80x110x30 feet.

The plant will utilize the wet process. Traylor Engineering and Manufacturing Company will furnish the kilns for both raw and finish grinding, which are to be the three compartment combination mills 7x26 feet. A Reeves Brothers kiln, burning fuel oil, will also be used. The clinker will be delivered to storage by a drag chain conveyor and a belt conveyor will deliver the finished cement to a 100,000 barrel modern concrete storage building. Bates valve bag packers will be used in the packing house.

The plant is laid out to reduce to a minimum the handling of all materials. This brings the total capacity of the Trinity Portland Cement Company to 2,000,000 barrels a year.

The Dallas plant was started in 1909 with an initial capacity of 750,000 barrels. Improvements and extension since have increased this to 1,500,000 barrels per year. The major part of these improvements include the installing of a Fairmount roll crusher with a capacity of 250 tons per hour, a No. 7 Williams mill, Edge Moor waste heat boilers with Foster superheaters, Green fuel economizers, radial flow fans, and an oil and gas fired Edge Moor auxiliary boiler.

The storage capacity of this plant has been increased to 200,000 barrels. The quarry of this plant, which is about 400 yards from the plant, is also underlaid with shale. Marion steam locomotives and Vulcan locomotives are used in this quarry. The dry process is employed in this plant. Eight Krupp ball mills and eight Gates tube mills are being used.

Mr. Bartholomew, the mill superintendent of the Dallas plant, has made some changes in the Kent mills increasing their efficiency and output so as to secure 42 barrels per hour per mill.

The original power plant has been replaced with a modern waste heat steam turbine unit. A 5,000 KVA Allis-Chalmers horizontal turbine, Wheeler condensers and a Curtis vertical turbine are now in use.

The many improvements made during the past few years at the Dallas plant and the new modern Fort Worth plant, will make the Trinity Portland Cement Company a big factor in the cement market of the South.

The organization of the Trinity Portland Cement Company consists of: W. H. McCourtie, president; C. E. Ulrickson, vice-president and general manager; A. S. Parsons, sales manager; O. V. Bartholomew, general superintendent; Charles Hurst, chief engineer; A. F. Miller, consulting engineer; J. W. Ganser, chief chemist; G. G. Tomlinson, traffic manager; J. J. Horgan, purchasing agent.

The San Fernando Rock & Gravel Co., expects to put out sixty 24,000 pound truck loads of crushed rock and sand daily for use in Los Angeles, Cal. A. D. Amstutz will be in charge of the plant. Acting with him on the board of directors of the corporation are: C. E. King, Charles Cox, M. L. Alexander and Clyde R. Moody.

Cableway Relay System Avoids Moving of Plant

When the Indiana Gravel Co. Found It Necessary to Open New Territory, a Second Cableway was Erected Downstream to Carry the Material to the First Cableway.

USUALLY when a sand and gravel plant has worked out its territory and outlived its modernity, it is relegated to the scrapheap and a new plant built in new territory, with modern building and equipment.

The Indiana Gravel Co., of Indianapolis, is not opposed to building new plants. It has a new one, modern and efficient in every detail, located a short distance from the old one, and this new plant already has dug away thousands of tons of high-grade material. Nor is this company slow about installing new and up-to-date equipment. Both the new and the old plant are equipped with the latest Sauerman draglines and buckets, crushers, screens and so forth.

The original plant of the Indiana Gravel Co. after eight years of operation worked out all the virgin territory within reach of its dragline. Beyond this area were large untouched deposits.

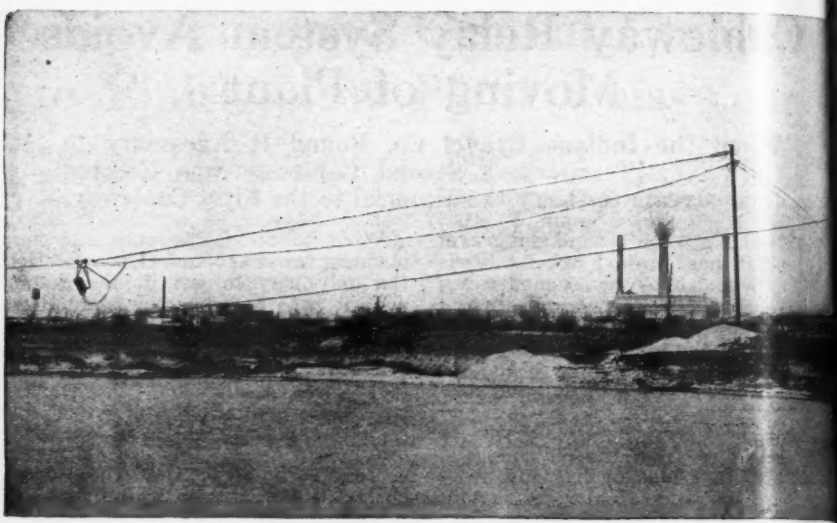
What to do? The only and very obvious answer to this question, the only way to get at the distant deposit, was to move the plant down the creek 500 feet or so.

New Cableway Supplies Old

Before this laborious and expensive move was undertaken, however, a careful investigation was made, and a less expensive plan of operation hit upon, namely, the installation of a second cableway that could work across the new area and dump the excavated material within the reach of the old cableway. From this point the material could be relayed to the tipple.

The cost of an additional cableway was found to be much below the bids for knocking down, moving and rebuilding the plant. Accordingly, a 600 foot span, 1 cubic yard Sauerman slackline cableway excavator was purchased and a 70-foot timber mast erected about 400 feet downstream

View of New Six-Bin Concrete Plant and Tipple.



General View Showing Two Sauerman Draglines, Forming

from the plant. There is a bend in the creek at this point, and the second cableway could be so placed that it would work practically at right angles to the first machine.

The relay arrangement after long-continued operation works perfectly. The new cableway simply empties its loads in the path of the other cableway, which in turn picks up and conveys the material to the screening plant, and within the semi-circle of a 500 foot radius, reached by the new cableway, enough high-grade material is available to keep the plant running at least another five years or longer.

An added advantage of this method is the fact that much of the foreign matter in the material is washed away during the repeated dumping and rehandling, the current at this point being sufficient to carry off much of the dirt, but not strong enough to affect the storage of the gravel.

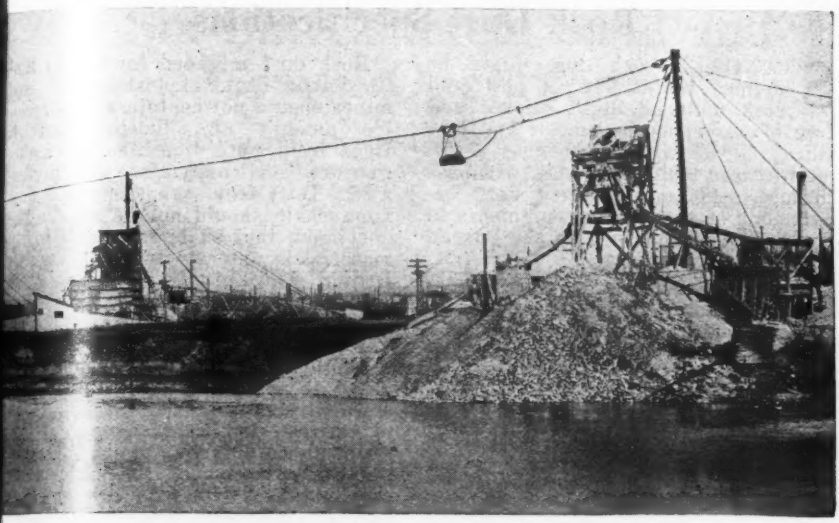
Because of the depth of the stream at this worked-out point—which is some 50 feet—a natural storage basin is formed, capable of holding enough material for several weeks' operation at the plant. And this storage is of special advantage during cold weather, there being always a supply of partially washed material available to be elevated to the plant.

The screening plant, which was built eight years ago, is of gravity design throughout. After four or five years of operation at another location on Fall Creek, the cableway was moved to its present location.

The bucket of this sturdy oldtimer empties into a steel-lined hopper, which discharges onto a 3x8 foot section of flat woven wire screen. Oversize material is chuted from the screen to a 9x18 inch Telsmith jaw crusher. From here it is fed to a short conveyor which discharges the crushed materials back into the stream in the path of the bucket. Material that passes through the screen is chuted direct into storage bins under the screen. Water for washing purposes is furnished by a 5-inch American pump.

The sand passing through a ¼-inch flat screen is moved through a steel-lined flume to two storage bins of 25 yard capacity each. Here it is separated into two grades by a section of 1x3 feet screen with ⅛-inch perforations which is placed in the bottom of the flume directly over one of the bins. In this way the company produced two grades of sand, coarse for concrete work and fine for masonry work.

This plant is electrically equipped throughout and is operated by three men, producing 300 cubic yards per day.



Relay System of Handling Material. New Plant In Center Background.

New Plant Thoroughly Modern

The new plant operated by this company—shown in the center background of the panorama—is a rotary screening plant equipped with a 1½ cubic yard Sauerman cableway, and is located on a gravel deposit a short distance from the creek. This plant

Tipple of the New Plant.

has an average capacity of 500 cubic yards per day, and storage capacity of 1,000 yards—250 yards in each of four bins.

The plant throughout is new and modern in every detail. The screen used is a large rotary screen of their own design and make. It is equipped with two large Link-Belt settling tanks, and the hoppers are also fitted with Link-Belt gates.

The gravel bed is worked to a depth of 85 or 90 feet. Deeper than this the material runs too fine to pay.

A De Laval pump, operated by a 25 h.p. motor, is used to supply water for washing material in the plant.

The officers of the company are: Jesse A. Shearer, president; Frank Billeter, secretary-treasurer. Mr. Shearer has also been secretary of the Indiana Sand and Gravel Producrs' Association, and is well known in Indiana as a pioneer of the industry. He is interested as well in a patented bucket which is widely marketed in connection with the Sauerman dragline excavators.

New Equipment Added

A steel loading hopper has just been installed, June, 1924, at this plant. While the installation of this hopper first was considered as an experiment, the initial results have been satisfactory and the company may install other and larger hoppers. The hopper holds twelve truck loads of sand or gravel, the trucks being driven under the hopper for filling, which is done by gravity. Another addition is a "jaw crusher" which is used to crush oversize material to the size of commercial gravel. Officials of the company report a heavy business, most of the output going for use in road building.

Rock Dust Specifications

STANDARD rock dust might be defined tentatively as powdered rock material, light colored and free of carbonaceous matter and free silica, all of which will pass a 20-mesh screen while 50% of it will pass through a 200-mesh screen, state Department of the Interior engineers in Serial 2606, just issued by the Bureau of Mines.

Such dust may be prepared from limestone, anhydrite, or shale free of sand and flint. For the initial rock dusting of the average nongaseous bituminous mines enough standard rock dust should be applied so that the combustible content of the resulting mixture of rock dust with mine dust shall not exceed 45%, a range somewhere between 35% and 45% being the practical objective sought.

All entries, slopes or passageways and room necks should be rock dusted. Additional safeguards are: rockdusting rooms; scattering of dust in vicinity of shots before firing; placing of dust barriers in the mouths of panels, cross entries and other key positions.

Redusting becomes necessary whenever the combustible content of the mine dust exceeds the permissible maximum. This should be determined by regular, systematic sampling, followed by a simple analysis of the samples for combustible content. A Bureau of Mines volumeter for measuring the density can be used for the determination of combustible content.

Rock dust properly used in coal mines to prevent coal dust explosions is not a hazard to the health of miners, according to Dr. R. R. Sayers, Chief Surgeon of the Bureau of Mines, Department of the Interior. It is true that dust produced in metal mining operations is often the cause of miner's consumption, but this is because of the peculiar character of that kind of dust, Dr. Sayers points out. In drilling operations, a dust is often produced that is very irritating to the lungs, and the continual breathing of this dusty air produces a bad effect on the miner. In coal mines, the rock dust used for the purpose of limiting explosions does not remain in the air to be breathed, but settles on the sides and bottom of the workings. In addition, dust that is not irritating is used for this purpose.

Rock dust intended for use in limiting coal-dust explosions in coal mines should not contain an appreciable amount of silicious particles. Dust from pure limestone, dolomite, gypsum, and anhydrite are preferable. Dust from sandstone and dust from shale should not be used. The dust from roof shale free from gritty material is extensively used in Great Britain, but not all roof shales are suitable; often they are too sandy or contain too much combustible matter. The Department of the Interior, through the Bureau of Mines, is prepared to advise operators as to the suitability of material or rock to be pulverized for coal mine dusting. Such advice may be obtained by submitting a sample of the material to the Bureau of Mines Experiment Station at Pittsburgh, Pa., where chemical, petrographic, and physiological tests will be made.

Specifications for size and character of rock dust to be used in coal mines as a means of preventing disastrous explosions have not yet been standardized by the Bureau of Mines, but so many inquiries have been received from mining operators and engineers who are considering adopting rock dusting for their mines that tentative specifications have been incorporated in Serial 2606. Copies of this Serial may be obtained from the Department of the Interior, bureau of mines, Washington, D. C.

Cement Accidents Reduced

Both frequency and severity accident rates were decreased by cement company members of the National Safety Council, according to the 1922-23 report. This record is in marked contrast to that of most other industries, which have reported increases for the year 1923.

The severity rate for 1923 was 5.411 and for 1922, 6.504. The number of hours worked in 1923 was 76,640,596. The frequency rate for 1923 was 41.6 and for 1922, 41.7.

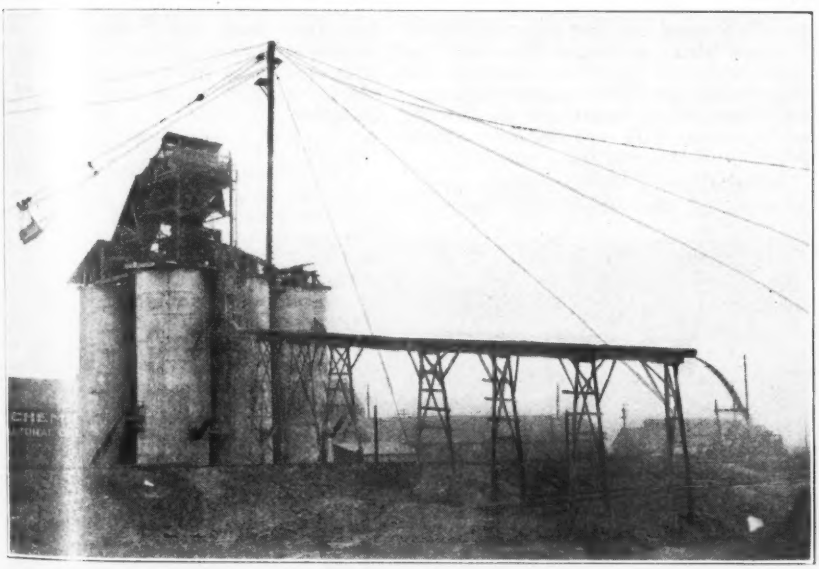
The Portland Cement Association's Safety Trophy for 1923 was awarded to the San Antonio Portland Cement Company, which came through the year with almost a clean slate.

A Six Bin Concrete Sand and Gravel Operation

One of Indianapolis' Oldest Concerns Has Modernized Its Business by Building a New All-Concrete Sand and Gravel Plant. Old Timber Tipple Is Still Producing.

INDIANAPOLIS, Hoosier capital, is situated in a sandy country, and in its environs are located quite a number of prosperous sand and gravel operations. There is the Indiana Sand and Gravel Company with two drag lines, already reported in PIT AND QUARRY, the Brown-Hoffstetter Sand and Gravel Company's two plants, the John Jones Company's operation and many others.

One of the progressive, well-known sand and gravel concerns of Indianapolis is the Granite Sand & Gravel Company of Indianapolis, whose operation includes two tipples, one an old timber structure which has rendered excellent service for years, and a new concrete six bin plant.



View of New Plant, Indiana Sand and Gravel Co.

An Indianapolis Institution

The plant of the last named concern is located out beyond the Belt Line terminal and the Stock Yards. As the visitor continues on his way from this point he comes presently to a community of gravel plants, intersected by railroad tracks, and clustered about, here and there, are also the plants of allied industries such as pavement and building block manufacturers. The two big plants of the Granite Sand and Gravel Company are easily distinguished from the rest.

This company in its plants and equipment is another illustration of the expansion and modernization of an old established enterprise, which adds to its equipment a new and thoroughly modern plant and at the same time continues in active, successful operation its old and somewhat antiquated operation.

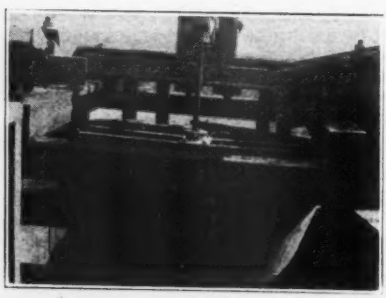
The Old and the New

For many years past the old plant, built large and substantial, although after the pattern of an earlier day, is

General View of Granite Sand and Gravel Company's

operating on a regular daily schedule of production. Although many of the heavy timbers of this structure no longer maintain their original geometric lines, they represent a sturdy and continuously profitable plant operation.

The new plant, on the other hand, embodies all the very latest ideas in



72-inch Link-Belt Sand Settling Tank.

sand and gravel plant construction and operation. As may be seen in the illustration, this plant is built almost entirely of concrete, and consists of six circular concrete bins, having a total capacity of 1200 yards, 200 yards in each bin. This plant was completed and commenced active operation in August, 1923.

Both plants are equipped with Sauerman dragline excavators, the old plant having two tipples and two draglines and the new plant one dragline. Each plant is equipped with a 2-yard dragline, and the old plant has also a 1½-yard Sauerman Dragline.

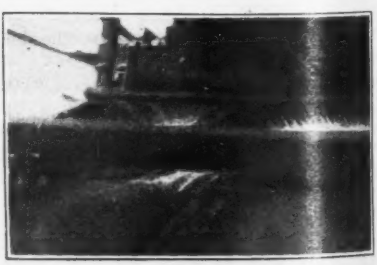
The Old Two-Tipple Plant

The old plant is equipped with two Webster screens, whose inside jacket measurements are 4 feet by 22 feet. The sand jackets measure 6 feet by 22 feet.

The capacity of the old plant's bins, which are five in number, is two cars apiece, totalling ten cars. Two Thomas hoists of 90 horse power are used in operating the draglines, and a small jaw crusher, "The Indiana," takes care of all the oversize material.

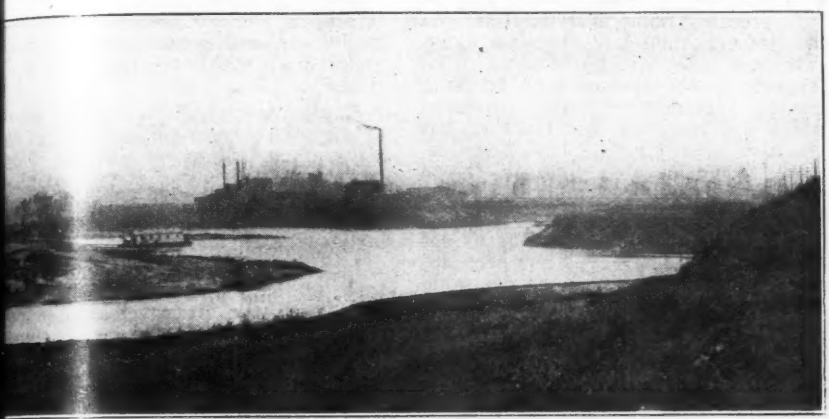
At the New Concrete Plant

The old plant, standing at the center of the big water-flooded operation from which unnumbered hundreds of tons of sand and gravel have been



Tyler Vibrator Screen.

taken since the organization of this company in April, 1914, has now been reinforced by this large new concrete capacity of from 30 to 40 cars. Active operation is carried on ten months out of every twelve, says Geo.



te Plant at Left, Old Plant In Center.

plant. The new six-bin concrete plant and tipple are located a few hundred yards away from the old site, and reaching out its long dragline arms to the nearest boundary of the old operation, is steadily scraping away at the enormous deposits of virgin material lying with its reach.

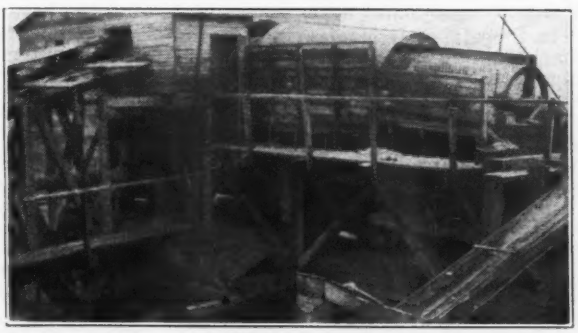
The six concrete bins have a capacity of 200 yards each or a total of 1200 yards. The 2-yard Sauerman dragline used here is operated by a 90 horsepower Thomas hoist. The tipple is equipped with a new "Tyler" vibrator.

The bins of the new plant are fittted with Link-Belt sand settling tanks of 72-inch measurement. There are two of these.

A Byers Truckcrane is used about the plants for handling and loading materials.

V. Miller, general manager of the concern. During last year most of the business was done by truck, selling direct to contractors. There are fifteen men employed in the operation of the two plants.

The officers of the company are: W. K. Miller, president, and Geo. V. Miller, general manager.



Part of Old Plant Showing Webster Revolving Screen and Conveyor Belt.

Company Owns 125 Acres

The total land owned and operated by the Granite Sand and Gravel Company is 125 acres, and because the operation has been extensive, much of this land lies under the water brought to the service by the constant digging.

The sizes of material produced range from ⅛ inch to 1½ inch, and the two plants have a total daily

The Casparis Stone Co., located at Columbus, purchased the Wilmington Limestone quarry at a reported price of about $85,000. The Wilmington plant is located near Wilmington, Ohio. The Casparis Co. intends to make improvements amounting to approximately $50,000 in its new plant.

Developments in the Explosive Industry

DURING the past few years there has been a trend toward a lower freezing point in dynamites. At the present time low freezing dynamites are made which are equal in all respects to the former high freezing grades. Explosives are produced which are not only *low* freezing but are also *slow* freezing, i.e., they require a considerable time to freeze once the freezing temperature has been reached.

In addition to low freezing explosives a non-freezing type has been developed which possesses the desirable characteristics of the low freezing types. The value of non-freezing explosives is apparent for operations carried on in cold weather. In quarries where it is paramount that operations be carried on continuously through the winter, non-freezing explosives find their greatest use.

One of the most recent developments in explosives is the production of a gelatin without fumes. Continual research and constant experimentation have developed a gelatin dynamite in which obnoxious fumes have been eliminated. This gelatin besides having the fumes eliminated and the freezing point lowered, still maintains its other desirable characteristics of plasticity and resistance to water, and it is therefore an ideal explosive for tunnel, mining and underground work, especially where ventilation is poor, as the use of it enables the workmen to return to the face sooner, save much time and thus increase production. This improved gelatin dynamite, popularly known to the trade as "fumeless gelatin" has met with hearty approval from users in engineering operations.

It has always been the trend of powder manufacturers to increase the safety of explosives to its maximum without sacrificing efficiency. This desirable feature has been accomplished to such an extent that it requires a strong blasting cap to properly detonate the explosive, and in some cases, notably with gelatin, the use of a stronger cap, increases efficiency. High explosives are made to be insensitive to any ordinary shock received in transportation or handling.

Explosives as now made run uniform as to characteristics and results. This is made possible by thorough testing and inspection during all processes from the raw material to the finished product. Unless subjected to improper storage conditions, modern explosives will retain their efficiency and remain stable for long periods of time.

Explosive manufacturers are advocating the larger diameters in the sizes of cartridges on account of the increased efficiency of such sizes. Recent tests by the U. S. Bureau of Mines confirmed the advantages of the larger size cartridges.

Increased efficiency in the manufacture of blasting supplies has kept pace with the improvements in explosives. Failure in the proper operation of detonators is of rare occurrence. When explosives fail to work properly the cause in nearly every case is found to be due to neglect in following the instructions of the manufacturers.

Improved methods of manufacture in recent years have reduced the risk to workers in explosive manufacturing plants to a point where the fatality rates are far below that of other large industries such as railroading, navigation and mining.

In order that explosive users may be kept thoroughly informed regarding the best explosive practices, Service Departments are maintained by the manufacturers to assist industries using explosives to obtain the greatest efficiency and in order to give assistance and advice in problems connected with their use, a force of men is kept in the fields for the purpose of demonstrating in mines, quarries, and for agricultural blasting. These men learn of new and improved practices and pass them on for the benefit of the consumer. Some of them specialize in certain industrial applications of explosives and are experts in their respective branches.

Western Ohio Portland Cement Co. has been incorporated for $6,000,000 under the Delaware laws. Incorporators: Bascon Parker, Niles, Mich., Adam Gilbert, Germantown, Ohio,

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The Boston Office of the Good Roads Machinery Co., has moved from 61 Oliver St., Boston, Mass., to 36 Pleasant St., Watertown, Mass., where a large warehouse will be maintained in connection with the office.

Lime in the Treatment of Trade Wastes

By JAS. R. WINTHROW,* Professor of Industrial Chemistry, Ohio State University

SEWAGES contaminated with various kinds of liquid discharged which are commonly called trade wastes—have become a major problem to engineers and manufacturers during the past three or four decades.

In the year 1909 Fuller called attention to the fact that chemical precipitation had a large application in this field, especially as a preparatory treatment, although consideration at that time was centered mainly around certain biological treatments. Since then the idea has been growing that chemical precipitation is the logical method to use in treating many types of industrial effluents.

From a survey of the literature, it would appear that lime has been used in some connection, although generally as a precipitating agent in treating almost every kind of trade waste.

The uses of lime in the treating of these wastes may be classified in general under the following heads:

(a) As a precipitating and coagulating agent.
(b) As a neutralizing agent for acid and similar wastes.
(c) As an agent to better the physical condition of sludge or to produce a sludge of fertilizing value.
(d) As an alkali to give the optimum a given precipitant to act effectively, or for biological action to take place.
(e) As an electrolyte and chemical precipitant in the electrolytic treatment of sewage.

Lime as a Precipitating or Coagulating Agent

Lime came into extensive use as a precipitating and coagulating agent about the middle of the 19th century, in England.

Before that time sewages had been treated by plain sedimentation and filtering processes. As time went on, industrial progress and expansion produced sewages of great concentration and containing various trade wastes, so that plain sedimentation and filtration failed to give proper clarification and purification.

Chemical precipitation was now resorted to, on rather a large scale, for the treatment of these sewages, and this method has continued up to the present time.

The first precipitating agent used in this connection was lime, generally added in the form of milk of lime. The amount of lime used varied at different places with the character of the sewage; sewage containing a certain type of trade waste requiring somewhat dissimilar treatment from that of a sewage containing a different trade waste.

In general, experience showed that the best results were obtained by adding just enough lime to decompose the carbonates present and to neutralize the sewage. If too great a quantity was added, soluble organic salts were formed, causing a very putrescible and obnoxious effluent. If too small a quantity of lime was added, sedimentation took place at a very slow rate.

Besides lime other chemicals were tried, but the best results were obtained with lime or a combination of lime and iron salts. This combination was found to remove most of the soluble organic matter as well as suspended solids, since a flocculent precipitate of iron hydroxide is formed which is very efficient in carrying down suspended matter and coloring materials.

Full scale tests for the amount of lime required to produce certain results have been the ideal way to determine the optimum proportions of lime or other chemicals to add to a given waste effluent. In actual practice in England, the quantity of lime necessary when used alone as a precipitant has been found to be about 15 grains per gallon of sewage treated. This amount of course varied with the quality of the sewage.

This lime precipitation process has also been in operation for a number

*Paper presented at the National Lime Association Convention, White Sulphur Springs, W. Va., on May 22, 1924.

of years in America, more particularly at Worcester, Mass., and Providence, R. I. The sewages at both of these contain considerable quantities of trade wastes and the process has been very satisfactorily operated.

At Worcester, Mass., over 7,300 millions of gallons of sewage were treated by this process during the year 1920. The amount of lime used varies between 6 and 10 grains per gallon. No iron is added, since the sewage is high in trade wastes containing iron.

The results of Hazen's experiments on such sewages as that just mentioned indicated that between 80% and 90% of the suspended solids can be removed in a retention period of 6 to 8 hours when correct precipitation methods are employed and that a 97% to 98% bacterial reduction results.

Other processes of this general character are the Spencer alumino-ferric process which consists in adding aluminum sulphate and iron salts, with or without lime, and the so-called ABC process in which lime, alum, clay and carbon are added to the sewage. These processes have given good results in some cases, especially with wastes that contain a good deal of colloidal matter.

From the results obtained in England, Worcester and Providence, it would seem that the popular prejudice against chemical precipitation methods of sewage treatment are not entirely justifiable and that chemical precipitation methods, if properly carried out, can be operated economically and efficiently.

Tannery Wastes

When we come to the treatment of such a typical trade waste as that produced by a tannery, we find according to Naylor that in England the various liquors from the tanning processes are precipitated with lime in a settling basin, after having been mixed, and are then run into aerobic filters. These waste liquors are made up of wash water from the preliminary washing process, lime dehairing waters, tanning pit liquors containing tannic and other acids, as well as pieces of skin and other putrescible matter, and are very obnoxious. The lime treatment assists in the deposition of the sludge and produces alkalinity conducive to the desired putrefaction on the filter. Here we see lime acting both as a precipitating agent and as an agent to give the alkalinity for the next step of the purification process.

In Massachusetts the waste liquors from tanneries have been treated with slaked lime and then passed through sand filters. It is claimed that 60 to 70 per cent of the organic matter is removed by this treatment and the effluent is in a satisfactory condition to turn directly into the streams.

Woolen Mill Wastes

The waste liquors from woolen mills contain fats, soaps, saponifiable matter, free alcohols and waste scouring agents. These wastes are thus high in suspended solids and mineral matter as well as grease and fats.

A method has been in operation where lime and iron salts are added to decompose the fats and soaps so they can be recovered. The resulting liquor is said to be free from suspended matter.

Acid suds effluents resulting from the grease recovery from suds by sulphuric acid, have also been very successfully treated with lime.

In Germany, a great deal of work has been done on the treatment of these woolen mill wastes with lime and colloidal clay. There seems to be a definite field for this latter process which has not yet been fully developed. It will be seen that lime is almost the sole precipitating agent for this type of trade waste.

Dye Wastes

When we come to the dye industry we find a kind of waste that is very difficult, in most cases, to treat. Dye wastes are usually high in suspended matter and contain dyes, acids and other obnoxious material. At one dye plant the waste liquor containing starch, soap, gums, dyes and acids, is treated with lime and alumino-ferric. About 4 grains of lime per gallon of sewage are used. The effluent is in an entirely satisfactory condition to discharge.

Brown has shown from experiments on certain dye wastes that when ferrous salts or alumina are used to treat the liquors, imperfect results are obtained unless lime is added also. That is, lime is the requisite agent to use in treating the wastes from the dyeing industry.

In another series of experiments on the effect of different chemicals on dye liquors of all colors, it has been demonstrated that the most efficient treatment was obtained by the use of

lime and ferric chloride. These two agents gave excellent coagulation and removed the coloring matter. Other precipitants did not do so well except in combination with lime.

Paper Mill Wastes

Liquors from paper works operating on the alkali processes are very polluting, even after the soda has been removed. The wash liquors and other wastes are first strained to remove fibers of pulp. They then contain clay, soaps, soda, etc. The treatment next given them is sedimentation with the aid of milk of lime. A very satisfactory way of treating these liquors also, especially if they are colored, is to add slaked lime and ferric chloride. The flocculent precipitate of iron hydroxide drags down the coloring matter. The waste liquors from the sulphite process of paper manufacture, are usually high in organic matter and sulphur dioxide. The treatment consists generally in a sedimentation process. Milk of lime is added and the liquors after settling are cascaded over towers to remove the sulphur dioxide gas.

Wastes from strawboard plants, which are high in organic, colloidal and suspended matter, have been treated by adding lime, running the liquor through a settling basin and finally through screened cinder filters. This is a particularly difficult waste to treat since it contains a great deal of very putrescible matter. This method of treatment has given quite satisfactory results. On the other hand the activated sludge process has not been successful with this type of waste.

Creamery and Dairy Wastes

Wherever a chemical precipitation process has been used in treating creamery and dairy wastes, lime has been almost exclusively the precipitating agent. Indeed according to the German chemist Guth, "lime is the proper precipitant for all creamery waste products."

These creamery and dairy wastes are of three types: (a) Fresh milk wastes, (b) Butter milk wastes, (c) Wheys. In large creameries, they are first treated with lime and then given a biological treatment. Lime and ferric cholide has been found to be the best removers of the odors of milk wastes, which in the main are due to the decomposition of nitrogen compounds and to rancid fats. Most of the organic nitrogen can be removed by adding an excess of lime over that required to neutralize acidity and then passing the effluent over septic beds. The activated sludge and Imhoff tank processes have not proven satisfactory, in general, for this type of waste.

Canning Wastes

Wastes from the various canning processes have sprung into prominence of recent years. Many types and kinds of treatment have been tried but no method has proven entirely satisfactory from every standpoint. There seems to be an excellent possibility for the development of a lime treatment process in this field.

In New Jersey the wastes from tomato canning have recently beer treated with lime and ferrous sulphate. The bulletin of the Illinois State Water Survey for 1913, gives the treatment for pea and corn canning wastes as being lime precipitation and neutralization, followed by sedimentation and filtering.

Starch Wastes

In the starch industry—that is in the manufacture of starch products from corn—the steep water is the main waste to be contended with along with cone and gluten water. These wastes are particularly heavy in total solids and besides are high in phosphates. The fact that the liquor is acid and that it contains nitrogenous matter, proteids and carbohydrates, gives fermentation an excellent opportunity to take place in a short time, and the liquor is thus difficult to treat both from the standpoint of time and chemistry.

Mechanical processes of treatment have failed utterly with such liquors and chemical precipitation has been resorted to. Since these waters contain phosphates, lime may be added, forming a floc precipitate of calcium phosphate. It is thus unnecessary to add iron salts in order to get flocculent precipitating action. The lime is added in the form of milk of lime. A clear non-offensive effluent is produced. At the Argo starch factory in Chicago it has been found that 11.7 lbs. of lime are required per 1,000 gallons of waste, to give the most efficient action.

These industries just given, represent only a few of the many manufacturing processes which produce wastes that are or might be treated with lime as the precipitating agent.

The possibilities for lime in this connection seem to be limited only by our ability to apply and develop processes efficiently and economically. In particular there seems to be an undeveloped but fertile field in the treatment of canning, dairy, sugar and paper mill wastes.

Lime as a Neutralizing Agent

One of the most obvious uses of lime is its neutralizing power. As a neutralizing agent lime finds application in treating acid wastes from pickling iron and steel products in the steel industry. The ferrous sulphate found by the pickling process is usually removed by appropriate methods and the spent acid liquor is then treated with lime. The lime not only neutralizes the spent acid but takes down the suspended iron salts as well.

Acid mine waters have become a source of pollution to many streams and are particularly detrimental to soil. They have been best treated with lime but there is need of accurate information on how to carry out the treatment effectively.

Acid wastes in the dye industry and paper industry have also been treated effectively with lime. The lime does especially well if iron is present since the floc precipitate of iron hydroxide is formed, which drags down suspended matter and absorbs colors.

In short, wherever an acid or similar waste is to be treated lime appears to be the agent to use, both on account of its efficiency and its relatively low cost.

Use of Lime to Better the Physical Condition of Sludge or to Produce Alkalinity

Another application of lime is in the treatment of certain kinds of sludge in order to better their physical condition and thus make them easier to handle. The filterability of sludges from the various sewage treatment processes, such as activated sludge, Imhoff tanks, Miles Acid and similar treatments, is a growing problem. The use of lime to improve filterability and physical condition of certain sludges has been tried in some cases. However, more research is needed along this line.

The addition of lime to Miles Acid sludge has given good results. The sludge before the addition of lime is quite acid and dries very slowly, but after the lime treatment it filters well and dries rapidly.

In some cases sludges nitrify exceedingly slowly. Experiments on the addition of several substances such as silica gel and clay gave no improvement. The addition of calcium carbonate, however, gave marked improvement both in rate and completeness of nitrification, which indicates that alkalinity may be a determining factor. Experiments are in progress on the use of lime in this connection.

In Germany, Rohland has developed a type of treatment called the lime and colloidal clay process. Trade and other wastes are treated by adding lime and finely divided clay of the plastic variety. This combination in contact with water forms hydroxides of calcium, aluminium, iron and titanium, which absorb coloring matter and settle out suspended material. The lime produces the desired alkalinity for the clay to act, and also is said to improve the physical condition of the sludge.

This process has been applied to the wastes from the dye, sugar, paper, tanning and soap industries. It is especially applicable to wastes containing coloring matter.

Lime as an Electrolyte and Precipitant in the Electrolytic Treatment of Sewage

Lime is now employed as an electrolyte and chemical precipitant in the treatment of sewage in the so-called "Direct Oxidation Process" and the "Selo Process." These processes are based on the passing of an electric current through sewage to which has been added lime. Nascent oxygen and hydrogen are liberated within the sewage. These readily attack organic matter and destroy it.

These electrolytic methods have been applied in some cases to specific trade wastes. At least one demonstration plant has given satisfactory results and at least two cities are installing the system for permanent use.

Conclusion

These remarks do not of course exhaust the uses, or the possibilities for use of lime in the treatment of trade wastes, either as a precipitating agent or in some other connection. There appears to be a very definite and quite extensive field for lime in the treatment of these manufacturing wastes. Wherever a neutralizing or precipitating agent is needed, lime is almost instinctively turned to as the logical substance to use.

Building Up a Reputable Industry

For Fifty-two Years This Sand and Gravel Concern Has Served the Trade, and Built Up a Industry Valued at $100,000 as Well as An Enviable Business Reputation.

AMONG the many busy, up-to-date sand and gravel plants in Indiana is the John Jones Company of Indianapolis. This plant, which is unique and interesting on more than one count, has for lo these many years past been producing building material for the trade and enjoying the respect of its competitors and many customers.

John Jones & Company consist of John Jones himself, owner, a man now old in years and gray, but genial as ever, and his son Virgil, Superintendent and General Manager. For fifty-two years past, father and son, who though not white of skin are eminently white of reputation in a business and financial way, have been carrying on a successful sand and gravel business.

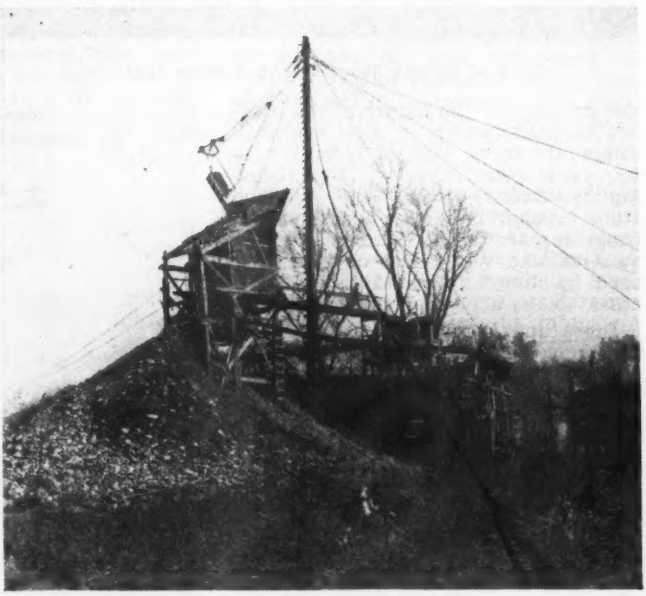
Fifty-Two Years in Business.

Fifty-two years ago Mr. John Jones, colored, industrious and ambitious, owned a few acres of land here at W. 21st Street and Brighton Boulevard, and operated a sand and gravel pit by hand and horse power. This continued for some years until finally the first tipple was built. Incidentally, it was during these years that the Indiana Statehouse was built, and it should be mentioned that no small part of the building material there used was supplied by the Jones company.

Through all these years the company has been operating, gradually growing until now Mr. John Jones, operating a first class tipple, is reputed to be worth $100,000.

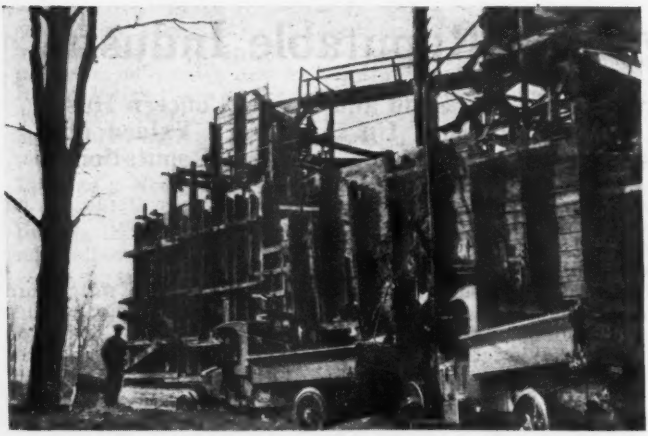
Plant and Equipment

Genial courtesy is the watchword here with all. When one approaches Mr. Engineer in his little house on the bank of the river and enquires concerning the dragline and hoist, motor and so on, the said engineer smilingly stops all operations and describes the equipment in detail. The dragline, says he, is a Sauerman Dragline, the bucket of 1-yard capacity; the hoist is an American hoist, operated by a 75 H.P. electric motor; and then painstakingly he starts and stops his motor just at the moment when the bucket, suspended above the tipple, is about to discharge its contents so as to allow the visitor to take a picture.



The Jones Tipple with Sauerman Dragline.

The screening plant is equipped with gravity screens which best serve



View of Storage Bins and Trucks Being Loaded.

the purpose for the nature of the product handled, which is mostly gravel. There are three bins of from 300 to 400 yards total capacity. For reducing oversize rocks an 8x16 Reliance stone crusher is used. The sand settling bins are of their own make, and an American Well pump of 20 H.P. is used in pumping the water from the creek to the screening plant.

Jones and Company own and operate their own delivery trucks, which are six in number. There are four Pierce Arrows, one Packard and one Ford, and all of them and their drivers are kept consistently busy all the time in handling the steady volume of business enjoyed by the company. Most of this is local trade.

An Exceptional Gravel Deposit

One of the outstanding features of the Jones plant is the nature of the deposit, which is strikingly different from that of every other producer in Indianapolis. With almost every other producer sand predominates to the extent of about 75 per cent, but on the Jones Company's land just the reverse is true, for throughout the entire deposit gravel uniformly predominates in the same ratio of 75 per cent to 25 per cent of sand.

Just how this peculiarity of deposit, as compared with their competitors, accrues to the advantage of the proprietors may be seen at a glance. It has at times even been necessary for Mr. Jones to buy stocks of sand from his competitors with which to fill his orders.

An Efficient Working Force

An index to the degree of efficiency and co-ordinated operation maintained is found in the fact that only three men are required in the actual operation of the plant, namely, an engineer for the screening plant, and a loader and general helper.

As an illustration of a successful and prosperous sand and gravel pit operated by colored folks, John Jones and Company occupy an unusual position in this industry.

Virgil Jones, Superintendent and General Manager.

It is reported with regret that William Hammerschmidt, president of the Elmhurst-Chicago Stone Company, Chicago, passed away on May 30, 1924.

Sand Blast Sand

By W. M. WEIGEL.*

SAND is one of the commonest materials for industrial use, not only as a building material, but in many industrial processes. The general name applies to all grades, from the comparatively impure, unsorted product used in concrete, to especially sized products of extreme chemical purity. Various definitions have been proposed, all more or less open to objection, as they fail to cover special applications. One is: "Sand—the fine granular material naturally or artificially produced by the disintegration or crushing of rock or slag." This does not fit the definition of sand as understood by geologists, who consider sand only as a naturally formed product. Another is: "Sand—The fine granular material naturally produced by the disintegration of rock." This does not take the chemical composition into account, and for practically all uses, except in concrete and plaster products, a material composed predominantly of silica or rather quartz, is implied.

Sand for special purposes usually requires different methods of preparation from those where the ordinary mixture of sizes as naturally occurring are suitable. One of the classes requiring the most uniformly sized grains, is sand blast sand.

Sand Blast Sand

The use of the sand blast has increased rapidly during the past few years. It was formerly used almost entirely in the foundry to clean and remove inequalities from rough castings. This is still the most important application, but in addition, it is now employed for the removal of paint from old surfaces, carving and engraving on stone and marble, glass cutting, cleaning or renovating the walls of stone and brick buildings that have become discolored, preparing the surface of metals for the electrolytic bath, putting the final finish to metal surfaces, and has even been proposed as a means of channeling or cutting out blocks of stone in the quarry.

Different Grades

Some producers, especially those in the Central States, or when only one or two grades are produced, have trade names for the different sizes. In the Eastern States, however, some attempt at standardization has been made and the grades or different sizes are numbered. Those commonly made, are No. 1, No. 2, No. 3 and No. 4; No. 1 being the finest and No. 4 the largest. Some producers made a No. 0, but this is unusual, while some do not make No. 4, as their sand banks do not contain sufficient material of this size. In general, a No. 2, for example, of one producer, is approximately equal in size to a No. 2 of another. Although the same sized screens may be used, differences in their method of operation, slope, and whether wet or dry screening is used, as well as the characteristic shape of the sand grains, will make variations in the finished products.

Producers have, in general, their own line of customers who are familiar with the use of the particular grade of sand they are using, and normally the producers would, at first, not see any advantage in uniformity of practice. It is not the intent or purpose of this paper to recommend standard sizes, but at the same time, it would seem advisable for the producers to get together and discuss this point. The following range of sizes is suggested:

Sand	No.	1.	Through	20 mesh	on	35 mesh
Sand	No.	2.	Through	10 mesh	on	28 mesh
Sand	No.	3.	Through	6 mesh	on	10 mesh
Sand	No.	4.	Through	4 mesh	on	8 mesh

Screening is not perfect, so that small amounts of coarse and fine material must be permitted. A maximum of not over 2 per cent failing to pass the coarser screen and not over 5 per cent passing the finer screen, should make a satisfactory product and not be difficult to produce in a commercial way.

Shape of Grains

Considerable difference of opinion exists as to the relative merits of sharp, angular grains and rounded grains. Advocates of sharp grain claim faster cutting and those of the rounded grain claim smoother work and longer life of the sand. That is, it can be used over more often and makes less dust. Many consumers have used only one kind and are therefore not basing their opinions on

*Mineral Technologist, Department of the Interior, Bureau of Mines.

fact. One consumer reported that they used a certain sand because it had sharp cutting angles and they preferred it to the round. An examination of the sand showed it to be a decidedly rounded grain material.

All quartz grains have about the same hardness, but there is considerable difference in the "toughness" or ability to resist crushing and shattering. No method of testing this property other than actual use has been developed. The results of plant tests would be interesting, but on account of the many variables entering into the work, would be misleading unless carried out most carefully.

Application of Different Sizes

Number O is little used. Number 1 is used for light work and where a comparatively smooth finish is desired, as for finishing automobile castings, finishing brass, frosting glass, and removing paint. A large manufacturer of pipe fittings, both brass and iron, uses No. 1 sand exclusively. Number 2 is used for similar work but of heavier character. A manufacturer of enameled bath tubs uses No. 2 sand only. Number 1 and 2 are the sizes mostly used. Numbers 3 and 4 are for the heaviest cast iron and steel work only, very little No. 4 being used.

Mining and Preparation

The main producing centers are New Jersey, Ohio and Illinois.

New Jersey produces both bank or lake and beach sand. Mining or recovery is by steam shovel if the bank is above water level, and will not hold water for a dredging pond. If a pond can be made, the mining is usually done by hydraulic dredging with centrifugal pumps placed on a floating dredge, and discharging to the washing and screening plant through long pipe lines. In some localities, as on the ocean beach, recovery is by locomotive cranes, equipped with clamshell buckets.

Washing of the sand is carried on in all cases. This may be only screen washing where the sand is particularly clean. Other methods include the use of sand cones, and helical screw washers of the Lewistown type.

In rare cases, the final screening or sizing is done wet, in rotary screens or trommels. This practice is unusual, as it involves the separate drying of each size. The usual practice is to dry the entire product after washing, or that portion of it taken out by wet screening to be sized to the various grades of blast sand. If only one size is made, it is usually by wet screening.

Both stationary steam dryers and revolving mechanical dryers are employed. The larger sizes, Numbers 3 and 4, are usually taken out by revolving screens of woven wire cloth. The finer sizes are separated on shaking or vibrating screens. At one plant, the products were screened twice to remove excessive over and under size and make a uniform product. At another plant, sizes 1, 2 and 3 are separated on stationary sloping screens. A good product is made, considering uniformity, but the efficiency is low and plans are under way to displace the stationary screens with vibrating ones.

The Ohio and Illinois sands are obtained generally from more or less coherent sandstone. Those in Ohio usually require crushing. The Illinois deposits are less consolidated and while they require blasting to loosen up the beds, disintegrate and fall to pieces in water sufficiently so that the material can be handled by dredging pumps.

Necessity for Washing

All bank and beach sand contains silt or clay, which, adhering to the quartz grains, can only be removed by washing. Also, varying amounts of vegetable matter may be present, which would break up and pass through the screens with the finished sand. A small amount of clay adhering to the quartz grains does not, in itself, lower the usefulness of the sand. For proper use, however, the sand must be perfectly dry; otherwise, it tends to choke in the sand blast machines. The presence of clay or similar foreign matter, may cause the sand to absorb moisture, and in this way, cause trouble in its use. Also, the amount of dust made is increased, but this is a small objection as clay dust is much less injurious in all ways than silica dust.

Utilization of Waste Blast Sand

In nearly all cases, the sand is used over and over, until the grains are broken too fine to accomplish the desired result. The fan exhausting the air, sand and cuttings from the sand blast room discharges to a collector of some form in which the dust is separated from the coarser material.

If a coarse size is used originally, the finer sizes resulting from breaking of the grains may be separated by screening and used for suitable purposes. In many instances the dust is considered worthless and is thrown away. At foundries a use may often be found for this material, and the following suggestions have been made.

"The United States Silica Co., Chicago, furnishes the following data on possible uses for waste sandblast dust:

1. As a foundry parting, it is shaken from a bag exactly as ordinary parting is applied.

2. Mixed with dead core or gangway sand it forms excellent cores, especially for thin, difficult work.

3. It can be used as a core wash in place of ordinary silica dust.

4. Under certain conditions, it can be used as a foundry facing, but the foundryman's judgment must be exercised in applying it to various classes of work.

5. It can be mixed with clay for luting the covers of annealing pots.

6. It has been employed successfully as an interlining between the brick flooring and the metal bottom of annealing and other furnaces. A layer of dry dust 1½ inches thick imparts a cushioning effect to the brick floor, which aids in preventing breakage under heavy loads. The sand also insulates the bottom of the furnace, which lengthens its life.

The waste sand also could be used as a mixture for making concrete, but as particles of iron and steel would lead to discoloration, it should not be used on work above ground. The sand also has been used for covering newly laid asphalt roads, with excellent results."—Reports of Investigations, Department of the Interior, Bureau of Mines.

Elk River Sand & Gravel Co., Franklin Co., Tenn., capitalized at $150,000 by J. E. Rodes, W. S. Baird, J. D. Senter, R. J. Shasteen and H. W. Crouch.

Northwest Engineering Co. announces that the George B. Curd Equipment Company, with a main office at Cincinnati and district offices at Indianapolis and Lexington, Kentucky, will now handle the sale of Northwest Gasoline Convertible Cranes, Draglines and Shovels in that territory.

When Not to Go Into the Gravel Business

WHEN sufficient water cannot be found to wash the gravel clean and to be used in screening, sorting and dewatering the oily water. Gravel plant capacities regulate amount of water required: 500 tons per day requires 5,000 gallons water per minute; 1,000 tons, 10,000 gallons per minute.

When railroad shipping facilities are not to be had at low cost and when highways are not paved for truck hauling.

When local market is not in need of more gravel and sand that is washed clean.

When an engineer is not to be had to decide on all vital questions relative to the building and equipping of profit-making plant for this line of business.

So very many points are required to make a gravel and sand plant pay, that it is very difficult to state all that are really required. Amount of gravel and sand in a deposit and the proportions one to the other, together with the size of the gravel, cut a very important figure in the success or failure of a new plant. These quantities must have a proper balance in order that all the material excavated shall be salable. Overburden to be removed and whether same is heavily wooded, should be noted, as such land is expensive to clear and make fit for excavating for washing purposes, as twigs, roots, etc., make bad work in screening.

C. M. AVERY,
Consulting Engineer Stephens-Adamson Manufacturing Co.

Worthington Pump Company Sells Cudahy, Wis., Works

In order to concentrate its manufacturing facilities as much as possible, the Worthington Pump Company on April 30 closed its Power & Mining Works at Cudahy, Wis. All lines of products excepting the Mining, Crushing, Cement and Creosoting Machinery are being transferred to their other works, manufacture of the latter products being discontinued.

In order to care for the wants of the many users of this machinery the Worthington Company has made arrangements with the Allis-Chalmers Manufacturing Company of Milwaukee to take over all records, patents, drawings, patterns, jigs and fixtures and the manufactured stock on hand, and to continue manufacture. The superior facilities of equipment and organization possessed by this company assure efficient and satisfactory service to all former Worthington customers in these lines.

Loadings Continue To Show Increase

Sand and Gravel Industry in Excellent Shape. Pan-American Highway Commission Here to Inspect American Roads

By Our Washington Correspondent

A MEETING of the executive committee of the National Sand and Gravel Association will be held at Chattanooga, Tenn., on July 15. This will be an open meeting at which all producers in the Southeastern territory are invited to attend whether they are members of the Association or not. Various questions pertaining to the welfare of producers will be discussed, for the most part to be brought up at the meeting by those present.

Secretary Barrows states that car loadings continue to show an increase over last year which previously broke all records. This would seem to indicate that the sand and gravel industry is in excellent shape and that business is booming. There are plenty of cars now and no complaints of car shortages are being received.

This country has just been host to forty members of the Pan American Highway Commission, consisting of engineers, economists and financiers from twenty-one South and Central American republics. They made a tour of road inspection throughout the United States, but before starting they came to Washington, were received by President Coolidge, Secretary Hughes and other officials, and were entertained several days.

The purpose of their visit to this country was to make an intensive study of roads and road building problems. They will decide upon a program for a Pan-American highway conference, to be called in Rio de Janeiro some time next year as a result of plans formed at the fifth Pan-American conference in Chile. Officials here believe it eventually means the letting of extensive road-building contracts to American firms, or, in any case, the purchase of large quantities of American road building machinery.

Secretary Wallace has announced the apportionment of $75,000,000 for federal aid highway construction for the year beginning July 1. Sixty thousand miles of the 170,000-mile federal aid highway system have been surfaced, the remainder requiring an annual completion of 11,000 miles, the work to be completed by 1934.

The apportionment of the 1925 funds by states include: Arizona, $1,053,003; California, $2,464,990; Colorado, $1,361,482; Connecticut, $475,513; Delaware, $365,625; Hawaii, $365,625; Idaho, $936,698; Illinois, $3,203,867; Indiana, $1,939,903; Iowa, $2,078,248; Kansas, $2,081,230; Kentucky, $1,411,584; Maine, $686,453; Maryland, $635,945; Massachusetts, $1,089;806; Michigan, $2,226,824; Minnesota, $2,120,906; Missouri, $2,423,485; Montana, $1,544,483; Nebraska, $1,577,155; Nevada, $947,623; New Hampshire, $365,625; New Jersey, $936,413; New Mexico, $1,185,528; New York, $3,663,105; North Dakota, $1,178,708; Ohio, $2,785,804; Oklahoma, $1,753,180; Oregon, $1,176,830; Pennsylvania, $3,365,956; Rhode Island, $365,624; South Dakota, $1,209,144; Texas, $4,410,169; Utah, $847,741; Vermont, $365,625; Washington, $1,113,309; West Virginia, $798,275; Wisconsin, $1,877,600; Wyoming. $936,372.

Shope Brick Company Wins Court Case

A victory of far reaching effect was won by D. F. Shope of the Shope Brick Company of Portland, Oregon, when Judge R. S. Bean of the U. S. District Court rendered a decision June 9, 1924, declaring the patents controlled by D. F. Shope as valid.

The decision was brought about through court action instituted by the Shope Brick Company against a local firm, Ward and Peterson, who were manufacturing brick by a similar process to that covered by the Shope patents.

The evidence in the case disclosed that Ward and Peterson mixed the slurry that they applied to the concrete brick separate and apart from the brick and then applied it to the face and stippled and agitated the face of the brick with the slurry applied, and Judge Bean of the District Court of the District of Oregon, held that this was doing substantially the same thing as called for in the Shope process, forming the slurry insitu, as per samples submitted in trial, and that the validity of U. S. patents on the Shope process could not be circumvented by such a method. The decision substantially held these old methods were used, and patentable in combination and sustained the patent.

The Cement Industry Shows Up Strong

Shipments Are Keeping Up To Requirements, Railroads Are Furnishing All Necessary Cars, and Prices Show No Change.

By Our Special Correspondent

ONE of the brightest industrial spots at the present time is that of the cement mills in the Lehigh Valley district of Pennsylvania. To be sure some of the plants have experienced a little slackening in advance business, but as a general thing, the mills all continue active, with current distribution on a good average.

A leading factor in call is to be found in road construction, and this type of work, not responsible upon market conditions following the arrangement of budgets, holds up at an encouraging rate, absorbing large quantities of cement. Unquestionably, it has gone far to ease any decline in other branches of construction in the demand for production. All eastern states are making the best of the season to proceed with authorized projects, with Pennsylvania, New York and Connecticut leading in volume of requirements.

The labor supply in this section is noticeably larger, and there is no difficulty, whatever, in securing men at the different mills.

Shipments are keeping up to requirements; the railroads are furnishing cars in desired volume, and have been assisted by the releasing of rolling stock that would ordinarily have been used for other transportation with all industries active.

Prices show no change. The mill base for the Lehigh Valley mills holds at $1.95, or a low level as compared with other producing centers. Any previous indication of advance, however, has been throttled by the existing trade conditions and the evident necessity for strict economy in this feature. A rock bottom base will produce more business than any attempt to increase.

Leading mills show no hesitancy in proceeding with manufacture and a normal rate of output prevails at such plants as the Atlas Portland Cement Co., Northampton; Pennsylvania Cement Co.; Nazareth and Bath; Lehigh Portland Cement Co., West Coplay and Fogelsville; Whitehall Cement Mfg. Co., Cementon; Alpha Portland Cement Co., Easton; and the Giant Portland Cement Co., Egypt. The working quotas at these plants are being maintained, and in several instances, the bagging departments are particularly busy.

Reflecting the activity at its Lehigh Valley district mills, the Lehigh Portland Cement Co. is giving concerted attention to its fourth plant unit and kiln, soon to be ready for service.

The Southwestern Portland Cement Co., El Paso, Tex., and Los Angeles, Cal., has decided to exercise options on property for a northern mill, located at Osborn, Ohio, approximately 10 milles from Dayton. The entire plant will be equipped for a production of 6,000 barrels a day, and this will probably be increased at a later date.

The Peerless Portland Cement Co., First National Bank Building, Detroit, Mich., is proceeding with the erection of its new plant on city site to cost in excess of $1,500,000 complete.

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of 20 cents each. State number of patent and name of inventor when ordering.

1,493,998. Crusher. Charles S. Lincoln, Wauwarosa, Wis., assignor to Allis-Chalmers Mfg. Co., Milwaukee, Wis.

1,494,076. Bottom-discharge bucket and the like. Giuseppe A. P. Provay, Lourenco Marques, Portuguese East Africa.

1,494,684. Ore mill and crusher. Frank Gross, Colorado Springs, Colo.

1,495,289. Excavating-bucket with attached lip. Donald H. Young, Berkeley, Cal., assignor to American Manganese Steel Co., Chicago, Ill.

1,496,203. Mining-machine bit. Newton K. Bowman, North Lawrence, Ohio.

1,496,213. Crusher. Edward H. Frickey, St. Louis, Mo., assignor to Dixie Machinery Mfg. Co., same place.

1,496,339. Mine-car. Wilbur D. Hockensmith, Irwin, Pa., assignor to Hockensmith Wheel & Mine Car Co., Penn, Pa.

1,496,407. Dipper for excavating-machines. Edward S. Black, Chicago, Ill., assignor to Inland Engineering Co.

1,496,576. Excavator of the scraper type. William H. Insley, Indianapolis, Ind., assignor to Insley Mfg. Co., same place.

1,496,976. Excavating-shovel. Paul Burke, Green Bay, Wis., assignor to Northwest Engineering Co., same place.

1,497,017. Excavating apparatus. Christian L. Hansen, Charles City, Iowa.

1,497,097. Mining-machine bit. Louis E. Everist, Chicago, Ill.

Crushed Stone and Cement Continue Active

Prices Remain Practically Stationary, and Prospects Good For a Big Production Year. Cement on a Stable Basis.

By Our Eastern Correspondent

ALTHOUGH there seems to be a sort of pre-election quietness in industry, this has not resulted in any general movement for stopping of production in the sand, gravel and quarry lines, and those well-informed in the industry hold to the opinion that the lull is only temporary, nothing to be particularly concerned about, with a decidedly easy money market and plenty of funds for right procedure in activity when the time comes. It is currently believed that the change will come about early in the fall, with probably a gradual improvement up to that time. One thing is sure, the consensus of opinion is that a resumption can be looked for well in advance of the forthcoming fall election.

As may be presumed, the labor market has changed. Common labor and skilled mechanics being now more easily secured.

Washed sand has moved to $1.00 a cubic yard in the wholesale trade, cargo lots to dealers and contractors. Good washed gravel is selling at $1.75 a cubic yard in wholesale shipments.

Crushed stone is operating under a better call, due in a way to activity in road work, and maintains at $1.75 a cubic yard for 1½ in. stock, and $1.85 for ¾-in. stock, wholesale in carload lots. Both figures are an advance of 10 cents a cubic yard over the prevailing average of a year ago. In retail circles, the price is $3.25 a cubic yard, both sizes, delivered to site.

Portland cement, as stated, is one of the stabilizing factors in the New York and nearby markets, and there is still noticeable strength in call. Delivered alongside dock to dealers and contractors, a price of $2.15 maintains, carload shipments, while delivered by truck to yard or destination, the figure is $2.50 and upwards per barrel. Boston dealers are paying $2.65 a barrel in wholesale lots and asking consumers $3.45 a barrel delivered, truckload quantities.

Pittsburgh Industry Shows Steady Production

Production In Sand and Gravel Markets Holds Up As Do the Steel Mills and Prices Remain Stable.

By Our Pittsburgh Correspondent

THERE is no slackening in production in the sand and gravel markets at Pittsburgh, Pa., nor any lessening of interest and activity in these important commodities. Advance orders indicate some decline, but not of sufficient extent to cause concern. The steel mills and other industries in this section continue quite active in the demand, and sizable distribution has been going forward in these quarters.

The ship repair yards are maintaining rather exceptional production schedules and are very busy. Practically every yard has been called upon for barge and steamer repairs, including hulls and other work, during recent weeks, while new vessel construction is coming along at a very good pace.

Price levels show no appreciable change, best river gravel being turned at $2.00, delivered on the dock, and at $1.60 aboard scow. The supply yards are holding up quite well with current orders, and are receiving upwards of $3.00 a cubic yard for stocks. Sand is meeting similar quotations, with incoming supplies absorbed in fair quantities. Crushed stone continues at a $2.85 figure per cubic yard, both sizes, in carload lots. Portland cement is priced at $2.19 and $2.20 a barrel in the wholesale market, less bags, carload lots, with retailers asking around $3.00 for delivered material.

Congress having failed to pass the river and harbor bill, it is expected there will be curtailment of projected work in the Pittsburgh district.

The Rodgers Sand Co., is keeping its diggers in service in the different pools, and hauling large quantities of material to the local port. Stocks are also being accumulated at the company's plants for future distribution.

The Iron City Sand Co., shows no change in its usual activities and is turning sizable stocks throughout this district.

NEW INCORPORATIONS

Papers of incorporation of Fairbanks Exploration Co., of Portland, Maine, were approved. Their purpose is to explore, control and operate mines, quarries and mineral rights. P. E. Coyle is president, and H. P. Sweetser, treasurer and clerk.

Articles of association have been filed in the secretary of state's office at Montpelier by the Brandon Rock Products Corp., Brandon, Vermont; capital $200,000, by E. A. Bellmore, Enoch C. Colby and Edwin C. Rockwell, all of Brandon.

The Tacoma Lime Co. is being capitalized at $275,000, their factory to be on Texada Island, B. C., with general offices in Tacoma. The officers are: President, W. C. Meacham; Vice-president, H. W. Jaeger; Secretary, D. W. Meacham; Treasurer, I. M. Bean.

A certificate of incorporation was filed for the Cooper Corporation, just organized in Salisbury, Md., to act as manufacturers' agents and brokers and handle all sorts of building materials and machinery. The present directors are: William M. Cooper, Mark Cooper, and L. W. Cooper. The corporation will represent, among other firms: The Phoenix Portland Cement Co.; Charlestown Sand & Stone Corporation; Penn Lime, Stone and Cement Co., and Ideal Concrete Machinery Co.

The Farnam Cheshire Lime Sales Co., of Manhattan, N. Y., has been incorporated at $50,000, by G. R. Brown, C. H. Fay, and M. Rubin.

The Patten Manufacturing Co., of Grand Rapids, Mich., successor to Utter & Patten, monument manufacturers and dealers, has filed articles of association. The concern is capitalized at $10,000 and the officers are: President, George L. Patten; Vice-president, Lillian B. Patten; and Treasurer, Laurice L. Patten. Ida Belle Patten is also a member of the Company.

The Pine Plains Lime Co., has incorporated under the laws of the State of New York to produce agriculture limestone and other by-products. The directors who have been elected are Adrian Langdon, Copake; George R. Culver, Millbrook; Dwight Sedgwick, Freedom Plains; Frank R. Chase, Pine Plains; J. Griswold Webb, Clinton Corners; Earle D. Tobey, Edgar V. Anderson, William N. Wetterau, Eugene C. Kelley and Jesse J. Adams, of Poughkeepsie.

The George H. Noone Sand & Gravel Co., of Boston, capitalized at $50,000, was incorporated by George H. Noone, Ada C. Stoddard and Ava Noone.

The Indianapolis Oolitic Stone Co., a Delaware corporation, qualified in Indiana with capital of $300,000, to quarry and deal in stone. The agent is Milton L. Clawson.

The Norvalt Corporation at Wilmington, Dela., will manufacture cement and plaster, with capital of $180,000.

The Grove Stone and Sand Company of Asheville, N. C., have started business with capitol of $200,000.

The Ashland Sand and Gravel Co., of Framingham, Mass., was incorporated for $50,000 by Angelo N. Leverone, Eugene A. Leverone, and Edgar H. Roy of Framingham, and A. Arthur Belisle of Worcester.

Marion Promotions

Harvey T. Gracely, Advertising Manager of the Marion Steam Shovel Co. has been promoted to Assistant Sales Manager. His engineering experience and as owner and operator of Marion equipment and in sales work well qualify him for the position.

Clarence E. Silva, formerly in the Engineering Department, has been promoted to Advertising Manager, taking Mr. Gracely's former place.

Bradley S. Carr, M. E.

Armour Institute of Technology of Chicago conferred the professional degree of mechanical engineer on Bradley S. Carr, manager of the pump department of the American Manganese Steel Co., at the commencement exercises held in June. Mr. Carr received his B. S. degree when he graduated from Armour in 1915.

Westinghouse Pipe Fittings

In a 36 page, two-color bulletin, *Circular* 1676, entitled "Westinghouse Fittings for Pipe Structures," the Westinghouse Electric and Manufacturing Company announces a new and complete line of interchangeable pipe fittings for structural work, and their application to such work as the erection of outdoor substations, switching equipment, switchboard frames, rocks, railings, fences, etc. It is profusely illustrated.

Peters, White & Co., Inc., Change Hands

Parsons & Petit of New York City, brokers of chemicals, have taken over the business, good will, agencies and employees, etc. of Messrs. Peters & White Co. Inc. This enables them to conduct in addition to their present lines the agency of the Salzbergwerk Neu Strassfurt, of Sehnde, Germany, for carbonate and caustic potash, the sale of the products of the Diamond Alkali Company of Pittsburgh, in the New York territory and all other chemicals and fertilizer materials formerly handled by Messrs. Peters, White & Co., Inc.

Crain's Market Data Book and Directory, 1924

The 1924 edition of Crain's Market Data Book and Directory of Class, Trade and Technical Publications, is off the press. The size and contents of this book, which is devoted to the buying structure of industry and commerce, and much of it to business papers, are a good indication of the size and importance of the business press, and the recognition on the part of business and industry of the important and necessary role the business press plays.

The book may faithfully be described as a good reference work on advertising and even on industry as a whole. The material handled includes many valuable references to buying habits and seasons, production and consumption, types of equipment used in various industries, and many miscellaneous facts and figures of value to business men.

The market data in this book is necessarily of a general character and is not intended to take the place of research work. Its object, as the publishers state, is "to aid the research worker by supplying the basis from which more intensive study of special factors may be developed."

The book is carefully indexed for ready reference.

O. & S. Truck Cranes

The new Orton & Steinbrenner Dependable Truck Crane is a full revolving crane mounted on a motor truck, and combines the advantages of a crane with the speed of a motor truck. It can be mounted on any new or second hand truck of 5 tons capacity.

The design of the crane is such that all parts are readily accessible and may be removed or replaced with a minimum loss of time. Practically the entire crane structure is cast or structural steel, and the construction is practically identical with the larger types of cranes.

The power is furnished by a heavy duty "Hercules" motor with four-cylinder 4 in. by 5 in. stroke, giving 37 H.P. This crane is suitable for handling any material such as sand, gravel, crushed stone, coal, coke, or the like. It is equipped with a ½ or ¾ cu. yd. clam shell bucket.

The removable counterweight compartment is an exclusive feature, for as some states do not permit loads in excess of 10 tons on hard surfaced roads the sand ballast carried to maintain balance may easily be dropped simply by opening the bottom of the compartment.

All wearing surfaces and bearings of the "Dependable" truck crane are bushed with removable bronze bushings. Drums and sheaves are of large diameter and easy on cable. The shafting is forged and turned, all the spur gears of cut steel, and all parts are manufactured on the duplicate part system, insuring a perfect fit. The turntable is a massive steel casting revolving on four large steel rollers, the "A" frame supporting the boom being structural steel amply riveted and braced. The greasing and lubricating is provided by "Alemite" pressure system.

The McClane-Brooks Co., of Scranton, Pa., manufacturers of grates and stokers, announce the appointment of Harlan W. Bird to be district manager for Indiana, in charge of sales and servicing for the whole state. His headquarters will be at Indianapolis. Mr. Bird formerly represented the Roto Co., of Hartford, Conn., and is a graduate of Armour Institute of Technology.

TISCO Steels

"PUTTING THE RIGHT STEEL ON THE JOB" is a 32-page booklet just issued by "Tisco"—the Taylor-Wharton Iron & Steel Co., of High Bridge, N. J. Primarily its purpose is to emphasize the enduring quality of TISCO steels. Some of the products of this concern are Disc Crusher Parts, Crushing Roll Segments, Pulverizing Hammers, Steam Shovel Dippers, Dragline Buckets, Orange Peel and Clam Shell Bucket Lips, Dipper Teeth, Sand and Dredge Pump Parts and Buckets, Sand Dredge Chains, Dredge Buckets and Bucket Lips, Bucket Bushings, Pins and Tumblers, Grizzly Screens, Bars and Dies.

This concern owns and operates three subsidiaries: Wm. Wharton, Jr., & Co., Inc., Easton, Pa.; Tigo Steel & Iron Co., and the Philadelphia Roll & Machine Co., of Philadelphia.

New Link-Belt Catalogs

Portable Loader Book No. 650, 40 pages, covers the complete line of Link-Belt industrial loaders: the "Cub" portable belt conveyor, the "grizzly" power-swiveling loaders which run on either crawler treads or traction wheels, and their standard types of bucket loaders for handling sand, gravel, stone and similar materials. *Electric Hoist Book No. 580*, same size, was developed with the thought that the greatest value to all could be obtained only by incorporating constructive material and operation data. Has over 100 illustrations. *Locomotive Crane Book No. 670* covers both Link-Belt Crawler and Locomotive cranes, and is also profusely illustrated with excellent views.

Lime Standards Adopted

A resolution pertaining to Building Code Requirements for Lime was considered and adopted by the Building Officials Conference of the United States and Canada. The suggested clauses which have been carefully prepared, are published as *Bulletin No. 309* of the National Lime Association. Complete information on any of the several uses of lime in construction may also be secured by application to the National Lime Association, 918 G Street, N. W., Washington, D. C.

McCord Radiator Company on Lubrication

Two new bulletins on the subject of lubrication have been issued by the McCord Radiator & Mfg. Company, Lubricator Division, 2587 East Grand Blvd., Detroit, Mich. *Lubrication of Heavy Construction Equipment* describes the part lubrication plays in the dependable operation of heavy machinery such as steam shovels, cranes, dredges, hoisting engines and other material handling apparatus. It is called the Class BA Catalog and contains a detailed description of their Class BA Force Feed Lubricator with illustrations and price lists. *The Economy of Better Lubrication* discusses the economy of efficient lubrication with regard to small steam engines, oil engines, gasoline engines, air compressors, steam pumps and auxiliaries. It contains complete illustrations, dimensions and price lists.

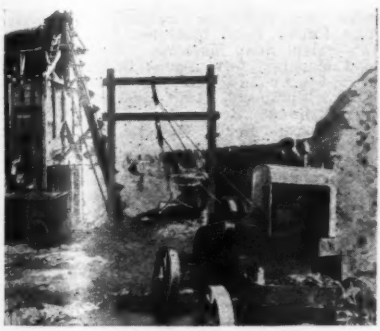
The Portland Cement Association announces the appointment of L. N. Whitcraft, formerly engineer attached to the Association's New York office, then in charge in New Jersey, as District Engineer in charge of the Philadelphia office, 1315 Walnut Street, effective June 1. Mr. Whitcraft has been connected with the Portland Cement Association for eight years, and is a member of the American Society of Civil Engineers.

New Sauerman Portable Scraper Outfits

A new and larger Sauerman Portable Scraper unit is announced in their *Circular No.* 124, just out. This is ¾ cu. yd. outfit, consisting of a ¾ yd. Sauerman "Crescent" scraper bucket, operating cables, all necessary guide blocks, bridle anchorage system, and portable hoist. The outfit is furnished with a 35 H.P. Sauerman gasoline hoist, 25 H.P. Sauerman electric hoist, or Sauerman belt hoist, designed for operation by a 25 H. P. electric motor or tractor.

These units were designed in response to the demand for a portable scraper outfit to be used with the larger portable crushing and screening outfits now on the market. When intended for a permanent plant installation, the outfit is furnished with the hoist mounted on skids instead of on tracks.

The ¾ yd. unit will supplement the ¼ yd. and ½ yd. portable scraper outfits and the standard Sauerman Power Drag Scraper systems in solving material-handling problems of sand and gravel plants, concrete products factories, contractors, county road commissions, etc.



Sauerman Portable Scraper Outfit Working Pit 300x300 ft. by 30 ft. Deep, In One Operation.

Rush contracts are said to be handled to advantage by means of Sauerman Portables, and production greatly increased. They are excellent for moving loose materials short distances and in regular sand pit digging.

Traylor Ball Mills

In *Bulletin* 103, a 44-page publication, the Traylor Engineering & Manufacturing Company, Allentown, Pa., describes with numerous illustration, the Ball Mills manufactured in its plant. The ball mill, says this bulletin, was developed to meet the demand for grinding or pulverizing equipment with a big capacity of finished product from a large size feed. There follow then fourteen pages dealing with the general subject of ball mills.

This is followed by a description of the construction of the Traylor Ball Mill, "the outcome of a very thorough and careful study of the work that a machine of this general design has to perform." The machine, they say, is simple in construction, of extra heavy proportions, and has incorporated in its design all of the latest improvements. This is followed by diagrams and dimension tables indicating floor space required for the various types of mills.

Foote Bros. I.X.L. Speed Reducers

A new catalogue has been issued by Foote Bros. Gear & Machine Co. of Chicago, entitled *Foote Bros. I. X. L. Speed Reducers, CATALOGUE NO.* 24.

Described as safe, compact, durable, and efficient, and designed for the benefit of many various kinds of manufacturers and machinery users, the I. X. L. Spur Gear Speed Reducer is used in "stepping down" the comparatively high speed of Electric Motors to those speeds required for any machine or special purpose.

These reducers are made in various sizes from fractional H. P. to 150 H. P. in stock sizes, and larger sizes to order. All types are made with a large range of reduction ratios so that any combination of reduction and strength can be supplied. They are enclosed and protected from all dust and grit.

The Universal Motor Truck Crane

The "Universal" full circle swing crane is designed to be mounted on motor trucks, and is therefore easily transported from job to job—"at motor truck speed." It will handle a ½ yd. clamshell bucket and requires only one man for operation. The bucket can be carried on the end of the boom chained to the front truck bumper. It does not require outriggers, so no time is lost in getting to work. Any used 5-ton or heavier truck can be used for a mounting. Loading 275 to 300 yards of gravel per day in emergencies is claimed for the "Universal," and because of its lightness and portability it can be used about any pit or quarry operation. Other advantages claimed are stability in road travel, equal efficiency with bucket, magnet or hoist block, and low operating costs. The Universal Crane Co. is located in Cleveland, Ohio.

The Insulation of Boilers

Several new bulletins on their products for the insulation of boilers and other heated equipment, have just been published by the Celite Products Company, Chicago.

Bulletin B-6e on "The Insulation of Boilers" describes in detail the method of insulating employed for various types and sizes of boilers, as well as figures on the fuel savings which can be realized by insulation. Blueprint Set B-16b contains charts on conductivities, as well as drawings showing the method of insulating various types of heated equipment.

Several other bulletins have just been published, among them being Bulletin B-8d on "The Insulation of Industrial Furnaces and Ovens."

Antioch Notes

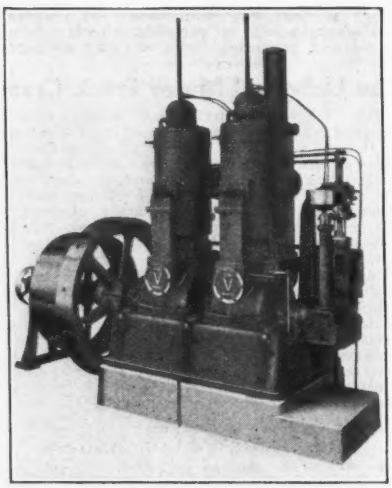
This little publication, *Antioch Notes*, is the organ of Antioch College and is published bi-weekly at Yellow Springs, Ohio. Antioch College is unique among American colleges in that it has full equipment for actual putting into practice by students of all that is taught in the school room. Theory and practice are combined, the student of engineering being permitted to work out in fully equipped shops and laboratories all that he learns in class, the agricultural student demonstrating in the soil of experiment ground set apart for the purpose all the theories of agriculture taught him indoors, and so on. Furthermore, the plan contemplates half-time practical work with about 150 business, professional and industrial firms, thus developing responsibility and helping students to decide upon and prepare for their vocations.

New Muncie "V" Oil Engines

A new Muncie Oil Engine is announced, the Muncie Type "V" Oil Engine.

Type "V" Muncie Crude and Fuel Oil Engines, manufactured by the Muncie Oil Engine Company of Muncie, Indiana, are of the vertical style, Solid Injection, Two Cycle, Semi-Diesel Dry type, and are made in 25 B. H. P. to 330 B. H. P. These engines, which have Standard Speeds of all sizes suitable for Direct Connected Electric Generator Sets, operate satisfactorily on any commercial Crude or Fuel Oil, Distillate, Solar Oil or Kerosene without any mechanical changes on the engine.

Type "V" Muncie Oil Engines are said by those who know, to be closely governed, and



smooth and steady operation may be had at full load, fractional load, or no load at all, on any of the above fuels. The combustion principles are such that better results are obtained at all loads and there are no delicate temperature range controls nor fine adjustments necessary as in other dry types of engines.

These engines are said to be suitable for any climate or temperature, and large water space provides for ample cooling under heaviest loads in hottest seasons. There are no incandescent metal surfaces. Fuel in liquid forms does not come in contact whatever with any portion of cylinder wall or piston end. The combustion chamber is entirely water cooled, and construction of all parts subject to high pressures and temperatures are uniform and symmetrical in shape, not subjected, therefore, to excessive strains and distortions.

Type "V" engines, the manufacturers say, are constructed only of best materials throughout, with all dimensions very liberal, allowing for strictly heavy duty service, and insuring long life and low upkeep cost. All required adjustments are easily accomplished by ready accessibility to all parts.

The illustration shown herewith is of a 110 B. H. P. Two Cylinder MUNCIE "V" Engine, Heavy Duty, Dry Type. Fuel consumption is estimated at .50 lbs. per B. H. P. The operator, standing at the governor end, has every control within easy arm's length and near shoulder height. The "V" is automatic in regulation of fuel feed and speed control, and has a quick pick-up under load changes

Morris Centrifugal Pumps

Bulletin No. 122 is a newly-published Morris Machine Works publication, describing Morris Double Suction Centrifugal pumps with horizontally split casing. The construction and operating details of these pumps are fully explained, typical performance curves are given showing the efficiencies and other characteristics of different sizes under various conditions of operation, and the use of these pumps is outlined for handling water, brine, oil, acids, pulp and chemical fluids and for service in irrigation, drainage, unwatering, filtration, sewage disposal, circulation in surface condensers, and heating and refrigerating systems, domestic water supply, boiler feeding, waterworks and standby service, pressure boosting, hydraulic mining, etc. Several installation and operating hints for centrifugal pumps are also given. Address Morris Machine Works, Baldwinsville, N. Y.

Russell Grader Catalog No. 24

In an attractive 72 page catalog, No. 24, illustrated throughout with many engravings in two colors, the Russell Grader Mfg. Co. of Minneapolis describes in great detail the many varieties of road equipment manufactured by them. These subject contents are classified under the following heads: Introduction; Pony Patrol Road Machine, 6-ft. blade; Hi-Way Patrol Road Machine, 6-ft. blade; Junior Road Machine, 6-ft. blade; Badger Road Machine, 6½ or 7-ft. blade; Standard Road Machine, 7¼; Special Road Machine, 8-ft. blade; Super-Reliance Road Machine, 10-ft. blade; Super-Mogul Road Machine, 12-ft. blade; Super-Mogul Scarifier-Grader, 12-ft. blade; Road Planer, 23; Road Finisher; Fordson Units; Russell Scarifiers; Hitch Items; Cutting Edges; Elevating Graders; Dump Wagons; Road Drags; Fresno or Brick Scrapers; Wheel Scrapers; Drag Scrapers; Road Plows; Steel Beam Bridges; Gravel Equipment; Crushers.

Russell Grader products carry a quality guarantee, and defective parts are replaced free of charge.

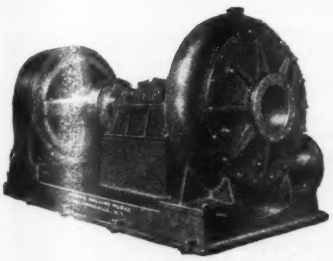
The New Waughammers

Two new bulletins put out by the Denver Rock Drill Manufacturing Company of Denver, Colo., have to do with the subject of Waughammers, Models 93 and 95, and Waugh Turbro Drillers, Models 31 and 34. These two models are described as light weight sinkers of proven ability, the Model 93 being a wet or dry sinker, and model 95 a dry sinker. Both drills are made of steel and drop-forged throughout, and are said to attain remarkable records for drilling speeds, dependability, and low maintenance. Alloy steel, drop-forging, scientific heat treatment and precise manufacture are features of the Waughammer. The new Waugh Turbro Drills, Models 31 and 34, meet the increasing demand in underground work for equipment that aids in economising.

O. K. Hoisting Machinery

Catalogue No. 24, just issued by the O. K. Clutch & Machinery Co., of Columbia, Pa., is a 24-page description of O. K. gasoline and electric hoisting machines, made in single, double and triple drum, reversible and non-reversible type. Attention is called to the fact that this company now makes hoists up to and including 70 H. P. in gasoline and 60 H. P. in electric models. In the near future circulars will be issued showing O. K. Hoists especially adapted for dragline work with two speeds, a very slow one for digging and loading and a faster one for incoming and for returning of the bucket.

Keep on making money during dull building and roadwork seasons



Typical Morris Sand and Gravel Pump

YOU can do it if you are lucky enough to own good deposits of sand and gravel that can be handled by hydraulic methods.

How?—**Put in a good big Morris Sand Sucker.** The low production costs and clean products will not only enable you to scoop business at a profitable price during the rush, but you can keep on going during the dull season by selling to smaller operators and dealers who cannot then deliver from their own plants at a profit.

Morris Engineers have pointed out the right methods and built the right pumping equipment for so many plants, that we can give you reliable performance, first cost and maintenance data on short notice.

Write for free but valuable literature and tell us your problem.

Morris Machine Works **Baldwinsville, N. Y.**

Originators of Centrifugal pumps, both single and multi-stage, and builders for practically all purposes since 1864

Branch offices: New York, 39-41 Cortlandt St.; Philadelphia, Forest Bldg.; Cleveland Engineers' Bldg.; Chicago, 217 N. Jefferson St.; Boston, 79 Milk St.; Pittsburgh, 320 Second Ave.; Detroit, Penobscot Bldg.; Charlotte, Realty Bldg.; Houston, 119 Main St. Sales Representatives: Buffalo, St. Paul, Kansas City, Denver, Salt Lake City, Seattle, Portland, Ore.; Los Angeles, New Orleans. Canadian Representatives: Storey Pump & Equipment Co., Toronto.

MORRIS
CENTRIFUGAL PUMPS

"Marion" Model 350

Bulletin 314 is just off the press describing and illustrating the Model 350 Shovel and the Model 360 Dragline equipped for either steam or electricity. The first large revolving shovel of this type was built in 1911. Since that time many developments have been made.

Despite their extraordinary power the new machines are easily operated by two or three men. The mechanical units are so perfectly balanced and the controls so well arranged that the handling of the machines is reduced to a new standard of simplicity. The Model 350 Electric is operated by one man.

The patented method of equalizing and leveling by hydraulic jacks eliminates much laborious and exacting hand work in preparation of the grade thus reducing operating costs. An improved design of rotating frame causes all loads and stresses to be transmitted directly to the strong truss members on each side.

An 8 cu. yd. dipper is regularly furnished for the 350 Shovel, which bites off from 6 to 15 tons each bite, averaging about 10 tons. This dipper will handle 2000 to 3000 cu. yds. of material each day, cutting a path 50 ft. deep and 65 ft. wide. The triple hitch to the dipper cuts the direct rope stress two thirds; reduces the bending stress over the sheaves; increases the life of cable and decreases the cost of operation. Address requests for bulletin 314 to the Marion Steam Shovel Co., Marion, Ohio.

Robertson Brothers Spiral Pipe Products

In a 34-page catalog, illustrated with many engravings the Robertson Brothers Manufacturing Company of Chicago describe in detail the Naylor Spiral Lock-Seam Pipe, and the many related parts and diversified products used wherever spiral pipe is used. The statement is made that "If a product can be formed or built of sheet steel, we can form or build it."

Naylor Spiral Lock-Seam Pipe is described as "always true to diameter and smooth inside." The Spiral Lock-Seam reinforces the body of the pipe, thus giving added extra strength for withstanding internal and external pressure. Pipe can be equipped for slip joint, companion flange or other styles of connections to meet varying conditions. It is supplied for the following uses, in diameters of 6 to 24 inches: By-Products Recovery Systems in Smelters, Foundries and Cement Plants; Water Supply Lines of All Kinds; Oil Supply Lines and Well Casing; and other lines. They are specializing in furnishing Spiral Lock-Seam Dredging Pipe to withstand unusually hard wear.

Other products manufactured are Forged Steel Flanges, Blind Flanges, Reducers, Clamp Bands, Flanged Fittings, Valves, Connections for Riveted Pipe, Conductor Pipe, Eyes Troughs, Ridge Rolls, Caps and Valleys, Flat and Corrugated Sheets, Swine-Swiller Hog Troughs, Galvanized Lock-Seam Pipe, Elbows, Ensilage Blow Pipe, Ever-Lined Deflectors, Complete Blow Stocker and Parts, Elevator Buckets and Grain Spouts.

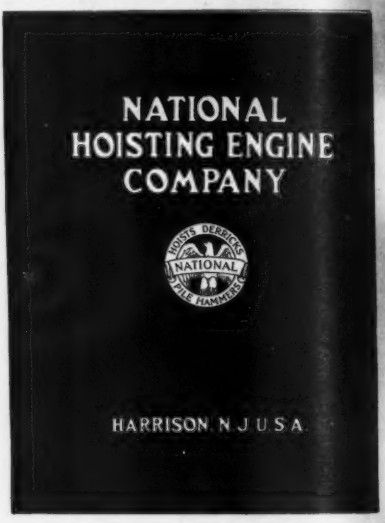
H. A. Sparrow has joined the Robert June Engineering Management and Industrial Advertising Organization of 8938 Linwood Avenue, Detroit, Mich. Mr. Sparrow, a graduate of Rensselaer Polytechnic Institute with the degree of M.E., has served as Assistant Sales and Advertising Manager with the London Steam Turbine Company of Troy, N. Y., and as Plant Engineer with the New York Telephone Company of Brooklyn.

National Hoisting Engines

The Twelfth Edition of the National Hoisting Engine Co.'s catalog is a handsome publication of 66 pages, printed in two colors and illustrated with fine engravings of the many different National Hoisting units. This book describes in considerable detail the various types of standard Steam Hoisting Engines, Electric Hoists, Gasoline Hoists, Belt Operated Hoists, Derricks and Derrick Fittings, Trench Cableways, Pile and Sheeting Hammers.

"By constantly keeping in touch with users in these various lines," says the introduction, "we have learned of many valuable and necessary improvements, insuring purchasers of strictly up-to-date apparatus. The duplicate part system is strictly adhered to, insuring positive interchangeability of all parts."

Users of hoists will find this an unusually readable book, and an excellent guide in buying. A complete repair part list is also included.



Among the Catalogs Recently Issued.

Hand Book on Gears and Speed Transformers

A 300-page black leather-bound hand book on gears and speed transformers has just been issued by the Wm. Ganschow Company, Chicago. This book, which is free to all operators on request, affords the users of gears and transformers easy access to data and formulae regarding their design and use, also much information useful in the designing of machines to which they may be applied.

There are tables showing strength and weights of materials, geometric formulae, decimal equivalents, wire and sheet metal gauges, and other information found only in general engineering handbooks. In a word, it brings together in one volume all information necessary for the design and specification of gears for any purpose. All types of gears are covered, also gears made of all general types of raw materials such as cast iron, steel, bakelite, leather, etc.